REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	Oct 25, 1995	

4. TITLE AND SUBTITLE
A Transaction Cost Analysis of Hybrid Forms of Contracting Implications for Prediction and Performance

5. FUNDING NUMBERS

6. AUTHOR(S)
Terry R. Adler

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
University of Cincinnati

8. PERFORMING ORGANIZATION REPORT NUMBER
96-062

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
DEPARTMENT OF THE AIR FORCE
AFIT/CI
2950 P STEET, BLDG 125
WRIGHT-PATTERSON AFB OH 45433-7765

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT
Unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

14. SUBJECT TERMS

15. NUMBER OF PAGES
97

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

GENERAL INSTRUCTIONS FOR COMPLETING SF 298

The Report Documentation Page (RDP) is used in announcing and cataloging reports. It is important that this information be consistent with the rest of the report, particularly the cover and title page. Instructions for filling in each block of the form follow. It is important to ***stay within the lines*** to meet ***optical scanning requirements***.

Block 1. Agency Use Only *(Leave blank)*.

Block 2. Report Date. Full publication date including day, month, and year, if available (e.g. 1 Jan 88). Must cite at least the year.

Block 3. Type of Report and Dates Covered. State whether report is interim, final, etc. If applicable, enter inclusive report dates (e.g. 10 Jun 87 - 30 Jun 88).

Block 4. Title and Subtitle. A title is taken from the part of the report that provides the most meaningful and complete information. When a report is prepared in more than one volume, repeat the primary title, add volume number, and include subtitle for the specific volume. On classified documents enter the title classification in parentheses.

Block 5. Funding Numbers. To include contract and grant numbers; may include program element number(s), project number(s), task number(s), and work unit number(s). Use the following labels:

C	- Contract	**PR**	- Project
G	- Grant	**TA**	- Task
PE	- Program Element	**WU**	- Work Unit Accession No.

Block 6. Author(s). Name(s) of person(s) responsible for writing the report, performing the research, or credited with the content of the report. If editor or compiler, this should follow the name(s).

Block 7. Performing Organization Name(s) and Address(es). Self-explanatory.

Block 8. Performing Organization Report Number. Enter the unique alphanumeric report number(s) assigned by the organization performing the report.

Block 9. Sponsoring/Monitoring Agency Name(s) and Address(es). Self-explanatory.

Block 10. Sponsoring/Monitoring Agency Report Number. *(If known)*

Block 11. Supplementary Notes. Enter information not included elsewhere such as: Prepared in cooperation with...; Trans. of...; To be published in.... When a report is revised, include a statement whether the new report supersedes or supplements the older report.

Block 12a. Distribution/Availability Statement. Denotes public availability or limitations. Cite any availability to the public. Enter additional limitations or special markings in all capitals (e.g. NOFORN, REL, ITAR).

- **DOD** - See DoDD 5230.24, "Distribution Statements on Technical Documents."
- **DOE** - See authorities.
- **NASA** - See Handbook NHB 2200.2.
- **NTIS** - Leave blank.

Block 12b. Distribution Code.

- **DOD** - Leave blank.
- **DOE** - Enter DOE distribution categories from the Standard Distribution for Unclassified Scientific and Technical Reports.
- **NASA** - Leave blank.
- **NTIS** - Leave blank.

Block 13. Abstract. Include a brief *(Maximum 200 words)* factual summary of the most significant information contained in the report.

Block 14. Subject Terms. Keywords or phrases identifying major subjects in the report.

Block 15. Number of Pages. Enter the total number of pages.

Block 16. Price Code. Enter appropriate price code *(NTIS only)*.

Blocks 17. - 19. Security Classifications. Self-explanatory. Enter U.S. Security Classification in accordance with U.S. Security Regulations (i.e., UNCLASSIFIED). If form contains classified information, stamp classification on the top and bottom of the page.

Block 20. Limitation of Abstract. This block must be completed to assign a limitation to the abstract. Enter either UL (unlimited) or SAR (same as report). An entry in this block is necessary if the abstract is to be limited. If blank, the abstract is assumed to be unlimited.

A TRANSACTION COST ANALYSIS OF HYBRID FORMS OF CONTRACTING:

Implications for Prediction and Performance

Research Proposal

by

Terry R. Adler

University of Cincinnati, College of Business Administration
Department of Management

October 25, 1995

DO NOT QUOTE

Abstract

A Transaction Cost Analysis of Hybrid Forms of Contracting: Implications for Prediction and Performance

by

Terry R. Adler

Ph.D. Candidate in Business Administration

University of Cincinnati

Professor Sidney L. Barton, Chair

Transaction Cost Economics (TCE) theories of exchange have proven to be a useful tool for understanding a variety of economic relationships. The TCE model has been especially useful in explaining the boundaries of economic institutions with regard to "make" or "buy" decisions.

However, the markets and hierarchies paradigm has been limited in explaining non-market and non-hierarchical relationships which are termed "hybrid" forms of governance. TCE theory indicates that as assets become more specific, as uncertainty becomes more acute and as transactions become incomplete, the hierarchical form of governance becomes predominant so that control of the transaction can be internalized to the organization. However, evidence suggests that this is not the case in many transactions where long-term contracts substitute for either the market or hierarchy form of governance.

Long-term contracts suffice if they sufficiently allow parties to maintain control of the transaction through the contract. Consequently, long-term contracts have to be "complete" enough to legally allow control while negating opportunism of the transactors.

The more incomplete the contract, the less control the transactors have in the relationship. While "incompleteness" of long-term contracts is an important concept in the hybrid form of TCE theory, neither it nor the efficiency of these long-term contracts has been adequately addressed in previous research.

The purpose of this study, then, is to explore the relationship between TCE transaction dimensions and types of contracts and how performance subsequently varies. The proposed research develops a new governance construct called "Contract Incompleteness" that identifies the degree of incompleteness in stating requirements of transactors in a long-term relationship. It is based on a buyer's explicitness in stipulating requirements in the contract from which the seller is obligated. Previous research has assumed that incompleteness is an important determinant of contract performance, especially with regard to expensive contract changes and seller opportunism. This study tests the relationship between asset specificity, uncertainty and contract incompleteness and examines the buyer and seller relationship to determine the effects of contract type on performance.

Hypotheses from transaction-cost theory are tested using archival data from multiple Department of Defense (DoD) research and development contracts. The potential implications of this research has two important messages for managers: 1) does contract type vary given degrees of asset specificity, uncertainty and incompleteness, and 2) does performance vary for different types of contracts.

Table of Contents

Chapter 1

Introduction

Current headlines continue to describe the difficulty firms have in acquiring firms. For instance, Time Warner's merger (a make decision) with Turner Broadcasting Systems sheds light on the problems associated with managing acquisition decisions (Meyerson, 1995). A key issue in this decision is the uncertainty associated with resolving unfavorable pricing conditions in carrying Turner programs on other cable systems. Acquisitions are complicated by uncertainty and a host of other transaction variables to be discussed later in this proposal. As a result, many times acquisitions do not enhance performance when governance structures are not efficient. Vertical integration may, in fact, harm productivity as was the case when General Motors (GM) bought Electronic Data Systems (EDS) in 1984. Many consider the problems created greater than the benefits gained when GM bought EDS.

Long-term contracting is viewed as an alternative to buying products and services in arms-length transactions or acquiring the producer of those products and services. Long-term contracting offers advantages over both hierarchy and market forms of governance. Long-term contracting provides less managerial control than a hierarchy but, as an intermediate form of governance structure, allows more flexibility in the choice of governance structure.

A recent example of this intermediate form occurred when Perot Systems Corporation and Tenet Healthcare Corporation entered into a long-term joint venture (a

form of long-term contract). Details of the relationship were spelled out and put into a contract which became legally binding on both parties to the contract. This joint venture was not a hierarchical decision where the two independent parties became one or a market decision where both parties remained independent. Instead, a joint venture was chosen because it allowed Perot Systems access to one of the largest and fastest growing industries of the U.S. economy--the American healthcare system--without exposing Perot Systems to the worries of the healthcare industry (Shapiro and Sharpe, 1995).

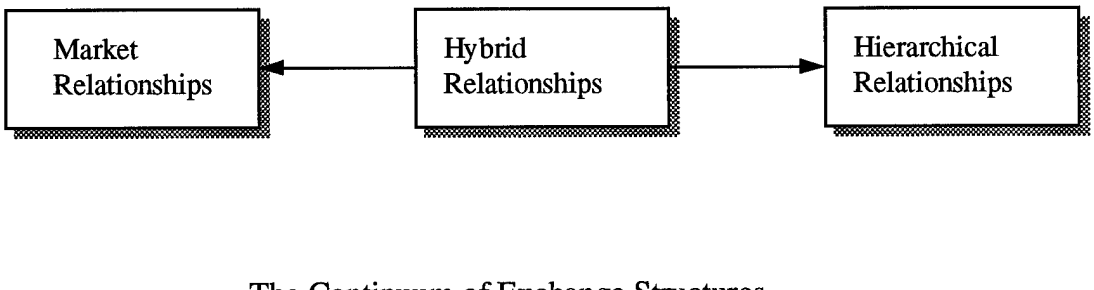
However, long-term contracting may not work out in all circumstances. GM's (now former) vice president of global purchasing "declared practically all of GM's parts spending up for grabs, including contracts already signed...potentially imperiling suppliers who invested millions in research and design for GM" (Stertz and White, 1992). Obviously, there is as much uncertainty in long-term contracting as there is in a make or buy decision. The question becomes to what degree does uncertainty and other transaction dimensions influence hybrid forms of governance? Clearly, in long-term contracting, there is quite a bit of variance in the degree of uncertainty and other transaction variables that legally bind parties to each other.

Consequently, what types of long-term contracts make sense? What factors affect the type of long-term contract used and do different types of long-term contracts lead to different levels of performance? These are the questions that motivate this research proposal.

A logical question then is what is a long-term contract? A working definition is a "hybrid exchange agreement." An exchange agreement is between two or more

competent parties and manifests agreement in clear terms to do or refrain from doing something. Hybrid means "anything of mixed origin" (Webster's New Twentieth Century Dictionary, 1970, p.888) and a hybrid exchange agreement is an intermediate form of the market and hierarchical framework (see Figure 1). The range of hybrid relationships falls in the continuum between market and hierarchies and includes long-term contracting (Williamson, 1991).

Figure 1: Alternative Governance Structures



The Continuum of Exchange Structures

However, the markets and hierarchies framework has been criticized because it is limited in its ability to explain hybrid forms of governance--those structures and relationships that are neither purely market nor purely hierarchy (Perrow, 1986; Hennart, 1990). Williamson (1991) has acknowledged that "transaction cost economics has been criticized because it deals with polar forms--markets and hierarchies--to the neglect of

intermediate or hybrid forms." Consequently, some researchers have referred to hybrids as "theoretical orphans" (Borys and Jemison, 1988) due to the paucity of significant research in intermediate forms of governance. Thus, the TCE model's value is limited because mid-range governance structures have not been not fully analyzed and understood.

This limitation is becoming more pronounced as organizations contract out more work rather than make their own products and services. For instance, two trends that are affecting governance frameworks are: 1) contracting as a form of agreement between business units within the same firm, and 2) less ownership of the production of high value items. In the former case, many firms are incentivizing business units by making them compete against each other. In this case, business units agree to support other business units through formal contracts. Naik (1995) found that even Xerox's PARC laboratories, an organization which invented laser printing and on-screen icons, must now get "contracts" from product divisions which direct research. In the latter case, many firms are contracting out the high-value added activities to other firms rather than do them in-house. Blenkhorn and Noori (1990) demonstrate that an increasingly higher percentage of the value added in automobiles is coming from suppliers' products not internal value added activities. Thus, the apparent lack of research of hybrid forms restricts our understanding of a growing trend to contract out.

This has two implications for managers: 1) firms that do not have the expertise to contract out will probably do business as usual when a more efficient structure is probably more appropriate, and 2) firms that understand the contracting process and use it to their

advantage will most likely create a competitive advantage over rival firms. Thus, those firms that use long-term contracting are more likely to realize the benefits of alternative forms of governance. Conversely, those firms that continue to conduct business as usual will continue to view and make the same market and vertical integration decisions that haunted many of the failed strategies of firms in the late 1970s and early 1980s.

Research Contribution

In summary, the focus of this research is to show . . .

(1) Why crafting long-term contracts are important and how different types of contracts are hybrid forms of governance?

(2) What conditions affect the selection of different contract types which provide flexibility in the governance process?

(3) How performance varies given different types of contracts and the implications of selection of contract types?

Firms that begin and continue to learn by implementing long-term contracting will in the short-term probably incur higher costs since understanding of this phenomenon is limited and resultant performance inefficient. However, in the long-term, these firms will most likely outperform firms that continue to struggle with make-buy decisions without consideration of the hybrid form of long-term contracting.

Consequently, the needs of business managers are not being met by today's research. Current theories do not adequately explain how, when, why and what types of contract types managers should pursue and under what conditions. Consequently, it is

proposed that this research benefits academics by advancing the state-of-the-art in the following ways:

(1) This research integrates previous research on governance structures and provides actual performance indicators for different types of long-term contracts.

(2) This research introduces constructs and associated variables for measuring governance structure and performance.

(3) This research tests the TCE framework for how transactions are governed between firms in an economic relationship.

Conclusion

Long-term contracting is a unique form of governance that does not follow traditional market and hierarchy theory. It is a significant form of governance because of firms' increasing reliance on external suppliers that generates the need for contract relationships. As suppliers provide a higher percentage of a product value added, the need for large "make" capabilities will diminish but some degree of dependence will flourish. Consequently, the hybrid form of long-term contracting continues to grow as a popular form of governance structure. Firms must maintain a sophisticated managerial and technical understanding of governance alternatives, capabilities and limitations. This research will benefit academics in understanding hybrid forms and managers in making intelligent strategic technology and product choices.

Chapter 2

Literature Review

In this chapter, relevant literature regarding transaction-cost theory and research will be reviewed and integrated. The literature review begins with an investigation of general TCE theory and then the empirical research. In addition, literature regarding incomplete contracts and the applicability of the TCE theoretical base for understanding hybrid contracting, especially in the Department of Defense (DoD) procurement process, will be reviewed. After research is reviewed, limitations and needs of extant research will be outlined.

General TCE Theory

Coase (1937) was an early scholar who influenced the development of TCE theory as we know it today. Outside the firm, he viewed production of goods and services as directed by price movements which are coordinated by a series of exchange transactions in the market. Within a firm, these market transactions are eliminated and the complex market structure is replaced by the entrepreneurial coordinator who directs production.

Related works that support Coase's theory were provided by Hayek (1945) and Barnard (1938). Both authors were concerned with how and why organizations change and adapt to their environment. Hayek viewed adaptation based on the price system which is an efficient mechanism for communication of information and for inducing change within the organization. Thus, Hayek's emphasis was on the market for inducing

adaptation in the organization (an external approach). Barnard viewed adaptation as a result of internal change in the organization. Thus, organizations adapt by coordinating investments and making realignments based on the resources it contains in the organization (the managerial perspective). Williamson (1991) argues that both perspectives on adaptation are needed in a high-performance system.

Previous author's efforts in understanding why firms exist were relatively new to traditional microeconomics theory. For instance, Alchian (1950) observed that traditional economic theory was not a "theory of the firm" but a "theory of markets." Thus, many of these ideas were not fully developed and integrated until Williamson's (1975) contribution on markets and hierarchies. In his book, Williamson provided the TCE framework which integrated Coase, Hayek and Barnard. The main hypothesis of his theory is to "align transactions, which differ in their attributes, with governance structures, which differ in their costs and competencies, in a discriminating way" (mainly, a transaction-cost economizing way).

The basic premise of TCE is that a transaction, the unit of analysis, will tend to be organized by structural arrangement, termed a "governance structure" (the dependent variable), that can execute the transaction most efficiently. Robins (1987) relates that transaction-cost theory employs what is termed the doctrine of economic efficiency to explain social organizations (forms of organization that are more efficient for economic exchange will supplant less efficient ones). The range of governance structures is from markets to hierarchies. The market is an arm's length structural agreement between independent parties. The hierarchy alternative involves internalization of one party into

another resulting in one party to the transaction. Between the poles of the market and internalization, there are a variety of intermediate modes of governance such as joint ventures or contracting (Williamson, 1985).

What determines the relative efficiency of different structural arrangements that mediate transactions is a key question. According to transaction-cost theory, the most efficient governance structure depends on the dimensions of the transaction and a comparison of the costs of transacting under alternative structural forms. The incentives associated with different governance structures differ in their capacity to respond to uncertainty and change as well as in the costs of setting up and running them.

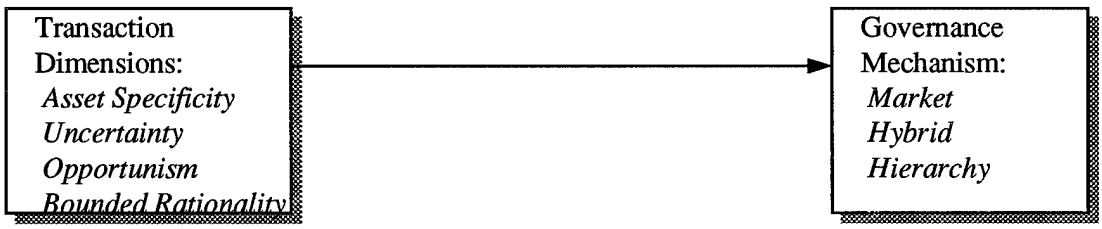
Dimensions of the TCE Model

Williamson (1975) argued that as markets fail, hierarchies form as the more efficient form of governance of transaction costs. He proposed that transaction costs are characterized by four dimensions: 1) the possibility of opportunistic behavior on the part of the parties to the transaction, 2) small numbers bargaining (later identified as asset specificity), 3) uncertainty about the future and 4) bounded rationality (Simon, 1961) (see Figure 2-1).

Some argue that Williamson leaves opportunism out as a source of variance in the determination of governance structures (Lincoln, 1990) since Williamson (1979) viewed it as a constant variable of human nature that affected transactions in similar ways. Because opportunism is pervasive and a part of all complex economic exchanges, it normally is not

measured. Others do not even accept opportunism as not an operative transaction dimension because of reputational factors (Hill, 1990; Donaldson, 1990). Thus, the three variables most studied in transaction-cost research have been asset specificity, uncertainty and, to a lesser extent, bounded rationality.

Figure 2-1: Governance Model



The Key Elements of Transaction Cost Theory

Based on Klein, Crawford and Alchian (1978), Williamson (1985, p. 56) emphasized asset specificity as "the big locomotive to which transaction-cost economics owes much of its predictive content" and the critical factor in determining choice of governance structure (Williamson, 1979). Williamson (1985, p. 55) defined asset specificity as "durable investments that are undertaken in support of particular transactions, the opportunity cost of which investments is much lower in best alternative uses or by alternative users should the original transaction be prematurely terminated."

This describes several types of relationship-specific transactions which will be discussed further in the empirical research section.

The essence of the TCE model is the assertion that differences in asset specificity are what determine the relative efficiency of various, distinct forms of governance. When asset specificity is low, market structures are a relatively more efficient means of governance. In contrast, when asset specificity is high, hierarchical forms are a relatively more efficient means of governing transactions. In addition, when asset specificity is mixed, or "semi-specific," intermediate or hybrid forms of governance are the most efficient. Hybrid transactions are neither market-like nor hierarchy-like but fall somewhere in between.

The level of uncertainty also affects the ability of the parties to a transaction to specify fully the range of contingencies. As uncertainty increases, it becomes more costly to write a fully specified transaction or contract. This is due to the cost of negotiating the terms of the agreement as well as the cost of searching for information. The rising cost in combination with the bounded rationality of the parties means that the number of unspecified contingencies increases. Williamson (1985) argued that under conditions of high specificity and increasing uncertainty, the costs of internal organization were less than the costs of using the market. Thus, hierarchies are proposed as the most efficient form when uncertainty and asset specificity are high.

The dimension of bounded rationality simply identifies that a person has cognitive limits in the amount of information he/she can gather, analyze and use in the transaction decision process (Cyert and March, 1963). Consequently, transaction terms will be

incomplete due to the inability to specify all terms and conditions of the transaction or contract. Thus, the longer the contract, the more unfeasible it becomes to draw up a contract that will exhaustively specify the obligations of each party under all possible contracting problems that might arise. While bounded rationality has a common-sensical appeal, it has not been an easy concept to operationalize. Consequently, most researchers have assumed that bounded rationality has led to incomplete contracts or transactions since people cannot be exhaustive in their specification of requirements and contingencies.

In theory, the combined effects of bounded rationality, asset specificity and uncertainty leads to transaction costs. Arrow (1969) defined transaction costs as the "costs of running the economic system." Williamson (1985) contends that the choice of economic institution for organizing and completing a transaction is based on a comparison of the costs of each alternative governance structure. The costs are the sum of the normal production costs (procurement, operations, marketing and support activities) plus the transaction costs of running the economic institution that organizes the exchange (negotiation, gaining commitment, maladaptation). Although internalization increases the likelihood of coordination and control, it comes with added bureaucratic costs. Johnston (1993) stated that firms that match the characteristics of the transaction with the minimum sum of bureaucratic, production and transaction costs will see the best possible relationship. Thus, when total costs for a governance choice are lowest, then that form of governance precedes other alternatives. Whether increases in production and scale efficiencies outweigh the costs of added bureaucracy due to internalization is always primary consideration in the governance structure decision.

Empirical Research

Asset specificity has been the focus of research because Williamson put so much emphasis on it (Williamson, 1985). He defines four types of asset specificity that affect choice of governance structure: site specificity, physical asset specificity, dedicated asset specificity and human asset specificity.

Site specificity refers to the proximity of the assets between parties in the transaction or contract. Naturally, the closer the assets, the lower the inventory and transportation costs.

Physical asset specificity concerns the nature of the task to be performed. The more unique the task, the higher the specificity of the assets in the transaction.

Dedicated asset specificity refers to assets which "are put in place contingent upon particular supply agreements and, should such contracts be prematurely terminated, would result in significant excess capacity" (Williamson, 1983, p. 526).

Human asset specificity refers to transaction-specific know-how accumulated by parties through long standing transactor relationships (Dyer, 1993).

In essence, assets tied to a particular transaction or contract lose value when that relationship is ended. Assets that are non-specific to a relationship should be of lower value to a relationship and, hence, less of a determinant of governance structure. Thus, transaction-specific assets create switching costs, or nonredeployable assets, (Porter, 1980) that bind parties to the transaction.

"Make" versus "Buy" Decisions

Many of the early studies in testing TCE theory involved operationalizing the dimensions of asset specificity or uncertainty. Monteverde and Teece's (1982) seminal work looked at the relationship between asset specificity and vertical integration. They found that "applications engineering," a form of asset specificity which measured worker-specific knowledge, significantly affected the degree of backward integration in the auto industry. This study provided a basis for understanding relationship-specific effects of human knowledge between two independent parties. Their results support Globerman's (1980) study on the telecommunications industry. Globerman found that firm-specific technical knowledge was a determinant of whether common ownership occurred of telephone lines and equipment. As Research and Development (R&D) demands of telephone carriers became more complex and uncertain, then common ownership (hierarchy) became predominant.

Armour and Teece (1980) added that when production facilities have technological similarities, common ownership of R&D and production resources enhance technological innovation. They found support that organizational structure influences R&D expenditures in firms confirming the specificity of the relationship between R&D and production tasks. Thus, R&D expenditures indicate the degree to which two independent parties, either as separate firms or as business units within the same firm, share specific assets.

The type of asset specificity is important in the determination of governance

structure. Masten, Meehan and Snyder (1989) discriminated between engineering specificity, a proxy for transaction-specific technical know how, asset specificity, a proxy for physical asset specificity and site specificity in the U.S. auto industry. Engineering specificity was the only significant measure that determined the decision to vertically integrate. Klein (1988) provided a qualitative assessment of GM's decision to purchase Fisher Body concluding that human asset specificity was the primary cause for vertical integration.

In addition, Pisano (1989) found that human-asset specificity was meaningful as a predictor of governance structure in the biotechnology industry and that equity relationships are more likely when R&D is part of the transaction, when multiple projects are contemplated and less likely, conversely, when there are many collaborators. These results support TCE theory with regard to relationship-specific transactions.

Site specificity can also be significant but in special cases. Most studies include a construct for site specificity since it is fairly easy to measure (i.e. the distance between transactors). In cases where site specificity does have a significant effect on choice of governance structure, it normally entails constrained geographic locations or types of commodity exploitation. This is especially true if the reduction in inventory and transportation costs exceeds the increase in bureaucratic costs associated with vertical integration.

For instance, Dyer (1993) examined how hybrid governance structures differed from market and hierarchies. His findings show greater site and human cospecialization between Japanese suppliers and automakers and performance than between United States

suppliers and automakers. He found that Toyota's high degree of specialization is a key to its ability to produce a higher quality vehicle, in shorter development time and with lower inventory costs. His results likely confirm a geographical effect in conjunction with other transaction-cost effects.

Such was the case in Hennart's (1988) qualitative analysis of the aluminum and tin industries. She found that high transportation costs and asset specificity dictate vertical integration over spot markets and long-term contracts in the aluminum industry. Geographical effects were very important in discriminating between the two industries. For instance, the tin industry exhibited no general pattern of vertical integration since the market for tin was worldwide while the market for bauxite was regional.

Studies which do not discriminate between types of asset specificity may be confounding the construct and missing important relationships in the determination of governance structure. For instance, Levy (1985) used two measures of asset specificity, the number of firms and the amount of R&D spending, to determine the degree of cross-industry vertical integration. He found cross-industry support for the hypothesis that research intensive industries tend to involve specialized assets and, thus, are more likely to vertically integrate. However, it is difficult to determine which part of the TCE model is supported here because type of asset specificity is not measured. His study demonstrates the difficulty of developing adequate measures in cross-industry studies.

Another limitation in the TCE literature has been in identifying and selecting target groups for study. Jacobson's (1988) study on how and why hospitals and physicians combine to provide medical services is a good example of this problem. She got mixed

results for her hypothesis that medical personnel, like specialists, would be the first to be internalized into hospitals because of their higher asset specificity than general practitioners. According to the author, this was in part due to the fact that data was not collected at the sub-specialty level which would have provided distinctions between measures of asset specificity. At high levels within the hospital, everyone is a specialist.

These studies are important and provide evidence that asset specificity determines governance structure. Physical and human asset specificity appear to be important determinants of the vertical integration decision.

Another important dimension of TCE theory is uncertainty which is based on Thompson's (1967) hypothesis that firms faced with uncertainty will vertically integrate. For instance, technological intensity, as evidenced by a high R&D to sales ratio, is likely to reflect high uncertainty, which raises the transaction costs of market structures (Osborn and Baughn, 1990). Walker and Weber (1987) found that different types of uncertainty affect the vertical integration decision in different ways. The author's focused on uncertainty over asset specificity in their study of make or buy decisions in the auto industry. Their results indicate that production volume uncertainty is significant in determining the make or buy decision and technological uncertainty is not significant when supplier competition is low. Thus, high volume uncertainty and low competition encourages vertical integration.

Harrigan (1986), in contrast, found sales variability, a measure of uncertainty, to lead to less vertical integration. She posited that firms do not need to vertically integrate to control the relationship when uncertainty is moderate or high. Vertical integration is

contingent upon the degree of control desired in the relationship depending upon the uncertainty that influences the relationship. In fact, uncertainty makes firms less likely to vertically integrate because of the added risks inherent in purchasing another firm. Thus, there appears to be disagreement in the literature regarding the effects of uncertainty. A review of Harrigan's study must include the caveat that she did not include a measure for asset specificity nor types of uncertainty which may account for her contradictory results.

While Walker and Weber's research indicates that there are different types of uncertainty, Harrigan's study illustrates the importance of measuring asset specificity and uncertainty when studying performance and choice of economic exchange.. Both Walker and Weber and Harrigan do not account for asset specificity which could have influenced their results. However, John and Weitz (1988) did measure both asset specificity and uncertainty. The authors investigated forward integration into distribution channels and looked at discrete and combined effects of firms that use direct and indirect channel strategies. With direct channels, the firm does not employ an independent reseller and retains ownership of the product. In indirect channels, the firm sells to independent resellers such as distributors and retailers. The authors found a positive relationship between asset specificity, uncertainty and performance assessment and the use of direct channels. Thus, dimensions of the TCE model were confirmed.

Future research needs to account for types of asset specificity and uncertainty and how these dimensions affect different forms of governance. Unfortunately, past research has ignored either asset specificity or uncertainty, or when they do measure these dimensions, does not account for the various types of asset specificity or uncertainty

effects on choice of economic institution.

The Use of Contracting as a Hybrid Form

Hybrid governance structures, the subject of extensive research, have included franchising, long-term contracts and informal agreements. For the purposes of this research, emphasis is placed on the contracting literature as the choice of hybrid governance structure. Consequently, the contract represents the transaction and is the unit of analysis.

An important problem initially existed for TCE researchers: finding examples where high levels of asset specificity and uncertainty led to non-hierarchical governance structures. Eccles' (1981) early research on contractor/subcontractor relationships opened the door for the possibility of a continuum of asset specificity. The author's finding that subcontractors could be governed through vertical integration without internalization by the contractor indicates that internalization occurs at some threshold level of asset specificity. Consequently, before that level, hybrid forms become the most efficient governance mechanism.

Masten's (1984) study confirmed Eccles' findings. He compared the alternatives firms face in whether to vertically integrate or contract out and found that higher asset specificity leads to vertical integration. At lower levels of asset specificity, intermediate forms are most efficient. Joskow's (1987) study of coal suppliers and coal-burning electrical plants suggest that long-term contracting can be a viable alternative to vertical integration where asset specificity is moderate. At the lowest levels of asset specificity,

the market form is the most efficient.

However, the results found by Eccles, Masten and Joskow have been challenged by Walker and Poppo (1991) who found that even with high levels of asset specificity, firms continued to use long-term relationship contracts. Their analysis of hybrid market supply relations examined component procurement by an assembly division of a major manufacturer. Their results challenge the nexus of the TCE model by questioning the validity of hierarchical forms of governance dependent on high levels of asset specificity. While this issue is important, many authors fail to consider intermediate forms of governance as replacements for traditional hierarchical structures. Variability in types of hybrid structures on the degree of hierarchy-like features may be one reason why firms are not vertically integrating. While Walker and Poppo's (1991) research focuses on asset specificity to the exclusion of uncertainty, Harrigan (1986) measures uncertainty to the exclusion of asset specificity. What is needed in future research are adequate measures that account for both asset specificity and uncertainty.

Thus, research has turned to the study of the extent of hierarchical content in different governance structures to answer these issues. Johnston (1993) contributed by providing a new measure of the continuum of governance mechanisms. His degree of "Hierarchical Content" is based on three elements: 1) the intensity of the incentives (profit margin), 2) the strength of ex post administrative policies and 3) the degree of ex ante administrative investments. He found that "Hierarchical Content" was positively correlated with asset specificity which supports the TCE model. However, this measure was not correlated with uncertainty. Thus, although the author's model confirms the

existence of alternate forms of economic exchange, it does not account for uncertainty associated with the exchange.

Contract Incompleteness

The study of hybrid forms continued in the evaluation of contracting as an intermediate form of governance. Evaluating how contracts are written has allowed researchers to account for uncertainty in how transactions are managed. Masten and Crocker's (1985) study of "take or pay" contract clauses between natural gas producers and pipeline firms is a good example. "Take or Pay" clauses require purchasers to pay for a contractually specified minimum quantity of output even if delivery is not taken. Results indicate that "take" obligations encourage efficient adaptation by relating the payment schedule in a contract to the alternative values of the resources either in sale to alternate customers or in storage for future use. In general, contract terms perform two functions: 1) they permit parties to establish a division of the gains from the transaction that allows both to cover fixed costs and 2) they determine the performance incentives in force during execution of the contract. Thus, contracts are a viable alternative to ownership. In addition, the way contracts are written are important for protecting high value assets in conditions of uncertainty.

Crocker and Reynolds (1993) also studied how contracts were written. They found a significant relationship between environmental and technological uncertainty and contract type (see Figure 2-2). They found support that Firm Fixed Price contracts are the

most complex and most complete and Fixed-Price Incentive Successive contracts are the most flexible and less complete. Each deals with uncertainty in significantly different ways. The authors found that the optimal degree of contract incompleteness involves a tradeoff between the degree of adding ex ante resources (contract formulation) to mitigate instances of ex post opportunism (contract disputes). They proposed that contract types differed by how complete the contracts were with regard to minimizing the costs of economic exchange. Although the degree of contract completeness was not measured, their study was important for discriminating between the complexity and content of different contract types.

Figure 2-2: Types of Long-Term Contracts*

Type of Contract	Degree of Incompleteness
Fixed-Price Incentive Successive (FPIS)	High
Fixed-Price Incentive Firm (FPIF)	High-Moderate
Not-To-Exceed (NTE)	Moderate
Fixed-Price with EPA (FP/EPA)	Moderate-Low
Firm Fixed Price (FFP)	Low

*Crocker and Reynolds (1993)

While contract type is important, the concept of contract incompleteness is central to the study of TCE theory. Williamson (1985) and Masten (1988) emphasized that contracts formulated in complex environments are *necessarily incomplete* (due to bounded rationality) which leads to ex post negotiations as contingencies arise. Argyres (1993) addressed the issue of contractual incompleteness by studying GM's acquisition of Machine Vision Technology and IBM's alliance with Lotus and Metaphor Systems. The author concludes that contractual incompleteness implies that upon the occurrence of some unforeseen contingency in the contracting relationship, it is possible that one of the parties to the contract may take action detrimental to the performance of the other. Research by Adler (1994) and simulations by Anderlini and Felli (1994) have shown that less information about the states of nature is typical in incomplete contracts than would optimally be expected if there were no constraints (like time, negotiating cost, etc.). Macauley (1963) also found that incomplete contracts are the norm in most business transactions while Holmstrom and Hart (1985) contend that incompleteness is probably at least as important empirically as asymmetric information as an explanation for understanding contract efficiency (i.e. monitoring and haggling costs for instance).

Consequently, the degree of contract incompleteness most likely affects the efficiency of different government structures. Al-Najjar (1995, p. 433) stated that "contract incompleteness reflects, at least in part, attempts to achieve a more efficient organization of exchange by minimizing the cost of governing transactions." When forming a contract, an organization must balance how much is explicitly stated in the

contract versus how much to leave out in case of contingencies. Hanson (1995) refers to this tradeoff as the risk associated with owning assets. He stated (p. 342) that "where parties are unable to securitize asset ownership, an alternative means to spread risk is to divide the ownership of physical assets among transacting parties." Thus, completeness of contract entails ownership of physical assets and incurs more natural (environmental) risk while incompleteness implies sharing of assets which incurs more hold-up (transaction cost) risk. He found support for this hypothesis in his study of the Mexican apparel industry.

A different approach was taken by Hackett (1993) in his study of incomplete contracts. He used a laboratory experiment to test whether higher asset specificity by one party to the contract leads to higher returns by that party. His results support his hypothesis and suggest that greater relationship-specific investments stipulated in the contract leads to greater levels of performance. However, as Walker and Weber (1987) and Harrigan (1985) point out, in conditions of technological uncertainty, more asset specificity is not necessarily beneficial. Thus, Hackett's study needs to account for uncertainty effects which more than likely will alter his results. His study points out a limitation of TCE-related research in that asset specificity and uncertainty are rarely considered jointly in their effect on governance structure.

The research on contract incompleteness indicates its importance to TCE theory and the efficiency of the firm. Previous research has assumed that contract incompleteness is an important determinant of contract performance, especially with regard to expensive ex ante contract changes and seller opportunism. However, contract incompleteness is

rarely studied even though it is an integral assumption of TCE theory. Further research needs to evaluate the relationships between contract incompleteness and other transaction dimensions and their effects on governance structure.

DoD Applicability

A reasonable question might be to ask if the DoD procurement process is applicable as a setting for evaluating TCE theory? For instance, are arms-length transactions feasible given the constraints of the DoD procurement law? Academic research has confirmed the inefficiencies which DoD contracting policies have displayed in the past (Fox, 1974). For instance, Gansler (1980, p. 2) stated:

> "Essentially, there is a gap between what the structure, conduct, and performance of the defense-industry market require to achieve economic efficiency and strategic-production responsiveness and the actual laws, regulations, policies and practices that are used to control this market. The government policy makers fail to recognize, or refuse to look at, this gross difference."

Several researchers have evaluated the DoD buyer-seller relationship. Peck and Scherer's (1962) seminal analysis of the economic issues associated with DoD contracting highlighted the inefficiencies of DoD procurement. Although their analysis is dated, they concluded that a true market system did not operate in the defense weapons acquisition arena because 1) prices were largely based on incurred or anticipated costs, not competitive prices, 2) the buyer exercised control over the sellers through external control of management (i.e. audits, management reviews, etc.) and 3) the buyer specified the

product to be produced. They also identified a continuum of contract possibilities which at one extreme uses competition to award fixed-price contracts for well-specified products (akin to a market system) and at the other extreme, uses negotiation to award cost-plus contracts for highly uncertain tasks, substituting administrative (hierarchical) control mechanisms for market mechanisms.

Scherer's (1964) subsequent research addressed incentive mechanisms on contractor performance. He found that sellers were motivated to efficiency when faced with a high contractor cost share and cost uncertainty. Thus, incentive-type contracts were clearly neither market-like nor hierarchy-like.

These studies suggest that the DoD procurement process is unique because competition is not prevalent. However, the DoD procurement process is becoming more competitive due to recent changes in federal law. Congress passed legislation called the Competition in Contracting Act (CICA) in 1985 to encourage competition and enhance efficiency. As a result, competition has been mandated in DoD contracting through the creation of stronger dispute processes, more favorable procurement laws and a competition advocate that oversees the DoD procurement process. Consequently, the United States Air Force (USAF), for instance, increased the percentage of contract dollars awarded competitively from 39.2% in fiscal year 1985 to 50.8% in fiscal year 1986 (Office of the Competition General of the Air Force, 1986). Thus, past inefficiencies are not as prevalent today.

Even if the DoD procurement process is more competitive, does TCE theory still apply? More specifically, TCE theory predicts that when asset specificity is high,

internalization occurs due to the benefits it offers over market exchanges. Why is this not the case for the USAF which enjoys highly specialized assets with its prime contractors in the development of weapon systems? Research has been presented which emphasizes the role of hybrid structures for high conditions of asset specificity and uncertainty. The USAF is another example where long-term contracting is providing the benefits of a hierarchy without having to nationalize prime contractors.

In addition, the dominance of innovation makes the USAF a special case. The nature of the transaction plays an important part in determining the type of governance structure chosen, especially when it deals with innovation (Williamson, 1985). Evanchik (1989) argues that the USAF has not "nationalized," or internalized aircraft firms because of the great need for innovation due to high levels of human asset specificity. In general, hierarchies stifle creativity, relative to a market structure, through additional bureaucratic controls. Consequently, hybrid forms of contracting have been used to maintain high levels of innovation without incurring many of the bureaucratic inefficiencies of internalization.

Another reason the USAF has not nationalized aerospace firms is due to the high asset specificity between prime contractors and their subcontractors. The government is limited by law in their capability and knowledge (low human asset specificity) in managing subcontractors. As a result, the lion's share of the development falls on the prime contractor to manage subcontractors. Thus, the prime-subcontractor high human asset specificity relationship protects against any DoD interest in internalization.

Heide and John (1988) provide support for this observation by studying small

agencies who lack the capability to vertically integrate but who are the target of larger partners seeking to vertically integrate. The authors combined resource-dependence and TCE theory and found that an agency will reduce its dependence on the principal by engaging in bonding behavior with the accounts of the principal's customers (a form of asset specificity). Higher asset specificity between agency and principal's customers offset the principal's ability to purchase the agency because the agent's dependence on the principal is reduced (lower asset specificity). In the USAF example, the subcontractors are similar to the principal's customers who maintain high asset specificity with the agency or prime contractor.

Thus, asset specificity and uncertainty are helpful in explaining hybrid governance structures and the lack of market and hierarchical examples. Competition and fixed-price contracts are used for products that are well-defined and where uncertainty is not too great. As the development effort begins to require more specialized assets and involves greater uncertainty, quasi-administrative control mechanisms are substituted for market mechanisms. With regard to the DoD procurement process, Williamson (1985, p. 73) states the following:

> "Defense contracting may appear to be a counterexample, since an elaborate governance structure is devised for many defense contracts. This reflects in part, however, the special disabilities of the government to engage in own-production. But for that, many contracts would be organized in-house. Also, contracts that are very large and of long duration, as many defense contracts are, do have recurring character."

Thus, the TCE model provides an adequate theoretical base for understanding hybrid contracting, especially in the DoD procurement process. Study of this process

should shed light on how and why contracting, as a hybrid form of governance, affects performance. In general, future research needs to focus on how innovation affects economic exchange with regard to asset specificity and uncertainty. Much of the data collected in the literature was from survey instruments and thus falls victim to the limitations of the survey method and self-reported data (Kerlinger, 1986; Calsyn, 1993). Consequently, other research methods should add to our understanding of TCE theory and performance affects. This literature review has encompassed four bodies of knowledge: general TCE theory, TCE empirical research, contract theory literature and DoD procurement research literature.

Limitations and Needs

It is clear from the discussion that the study of hybrid structures offers future insight into how economic exchanges occur. Where the dichotomous market and hierarchy framework fails, hybrid structures offer alternate explanations and potential explanations of efficiency. Contracting, as a hybrid structure, is an important and relevant alternative to economic exchange to both spot-market exchanges and vertical integration. Increasing our understanding of the types of contracts available to spot-market exchanges or vertical integration should improve management's formulation and implementation of business contracts.

In summary, the primary limitations of prior empirical research are that

1) variations of hybrid governance need explanation, 2) asset specificity and uncertainty are not adequately considered in determining governance structure, 3) little is known about contract incompleteness and its relationship with other TCE dimensions and performance and 4) data other than that collected by survey should add to our understanding of performance. These issues limit our efforts to build and test theories that predict how economic exchanges should be organized. Consequently, understanding how performance changes with type of governance structure in context of transaction cost theory is also limited.

Chapter 3

Theory

The first chapter addressed the fundamental issues that began this research: What types of long-term contracts make sense? What factors affect the type of long-term contract used and do different types of long-term contracts lead to different levels of buyer-seller performance? In Chapter 2, a literature review that addresses these questions revealed limitations in the extant research: (1) variations of hybrid governance need explanation, 2) asset specificity and uncertainty are not considered adequately in determining governance structure, 3) little is known about contract incompleteness and its relationship with other TCE dimensions and choice of governance structure and how hybrid forms of governance affect performance. This chapter extends theory by proposing a hybrid governance model of long-term contracting and the constructs and hypotheses needed to test this model. This chapter first discusses the theoretical background of constructs proposed in the model. Hypotheses which describe key relationships between constructs are also integrated in the discussion of the model.

Coase (1937), Williamson (1975) and Klein, Crawford and Alchian (1978) emphasize that less efficient forms of governance structure fail in lieu of other more efficient forms. When transactions involve high degrees of asset specificity and uncertainty, transactions are most efficiently governed by the hierarchical form of structure. When asset specificity and uncertainty are low, the market transaction is the most appropriate. For intermediate levels of asset specificity and uncertainty, hybrid forms of governance are most efficient. Long-term contracting as a hybrid form of

governance should exhibit moderate levels of asset specificity and uncertainty when compared to market and hierarchical structures.

Key to assessing asset specificity and uncertainty is the concept of bounded rationality. Bounded rationality is a behavioral dimension that affects choices made in making the contract. Bounded rationality limits the capability of the parties to fully detail all important aspects about the transaction, especially for longer type contracts. Thus, bounded rationality leads to incomplete contracts due to this limitation which supports the need for governance and leads to ownership as a form of last resort (Grossman and Hart, 1986).

Short of ownership, however, long-term contracting is a viable option to governance and is characterized by its incompleteness (Stinchcombe, 1985). Long-term contracting differs from spot-market exchanges primarily in that the periods of performance are not of short duration. Consequently, long-term contracting does not have a near-term effect on transactors with regard to contract completion. Rather, in long-term contracting, performance is in the distant future and terms and conditions are placed in the contract to protect the rights of both parties (neoclassical law) (Williamson, 1991).

Many studies have shown that long-term contracts are efficient when compared to market or hierarchy alternatives. For instance, Masten and Crocker (1988) studied the natural gas industry and found that contract terms covered longer periods of performance when faced with high degrees of asset specificity. DeCanio and Frech (1993) found that long-term contracts resulted in lower spot prices in the natural gas industry. Therefore,

long-term contracts do offer efficiencies over other alternatives. The next section describes transaction dimensions and the types of contracts used in economic exchange. Two related research models are presented. Hypotheses to test the relationships between constructs in these models are developed.

Asset Specificity

As discussed in the literature review, Williamson (1985) assigns much of the predictive power of the transaction-cost theory to asset specificity. Williamson (1985, p. 55) defined asset specificity as "durable investments that are undertaken in support of particular transactions, the opportunity cost of which investments is much lower in best alternative uses or by alternative users should the original transaction be prematurely terminated." He differentiates between four kinds of asset specificity that determine the type of economic exchange: site, physical, human and dedicated.

Site specificity has been tested in the literature and has shown positive results. For instance, site specificity was found to be a predictor of governance structure in the automobile industry (Dyer, 1993) and in commodity manufacturing (Hennart, 1988; Joskow, 1987). These studies addressed broader TCE issues where firms had the choice to internalize or conduct spot-market transactions. However, this study does not consider site specificity due to the nature of the research setting. The USAF conducts all weapon procurements from one central location. Because of its unique situation, as discussed previously, it does not internalize transactions. In addition, where geography is

unconstrained, many studies have shown it to be a non-significant variable in the determination of governance structure (Pisano, 1989; John and Weitz, 1988; Masten, Meehan and Snyder, 1989; Caves and Bradburd, 1988; Argyres, 1993; Jacobson, 1988). Thus, when contracts are awarded indiscriminately, regardless of geographic location, site specificity is not germane. Consequently, site specificity is not included as a determinant in the choice of governance structure in this study.

Conversely, physical, human and dedicated asset specificity should be significant determinants of governance structure. Physical asset concerns the nature of the task to be performed. The more unique the task, the higher the specificity of the assets in the transaction. Physical asset specificity addresses the type of equipment, machinery and unique tasks that are used in an economic exchange (Palay, 1984). Argyres (1993) refers to these assets as "system specific" which are nonredeployable resources that are committed to a technological system and are specific to that system. He found support that system specific assets are a determinant of choice of governance.

Other results are also significant and in the expected direction with regard to physical asset specificity's effect an governance structure. Levy (1985) and Jones (1987) found that a firm's level of R&D expenditures is a significant determinant of institutional structure. He demonstrated that research intensive firms tend to involve specialized assets. This asset specificity leads to vertical integration in firms where R&D is predominant. Thus, the role of R&D is specific to a firm and affects the choice of vertical integration of other firms.

Armour and Teece (1980) also found that the level of R&D expenditures affects

the choice of organizational structure internally. They found that R&D and production joined departments when R&D expenditures were high. Thus, the level of R&D expenditures is an indication of the degree of physical asset specificity that leads to vertical integration.

TCE theory predicts that vertical integration will occur when physical asset specificity is high. Hennart (1988) found this to be true in the aluminum industry. She found that the need to tailor a refinery to a specific type of bauxite tends to lock bauxite mines and alumina refineries into trading conditions that approach bilateral monopoly. She concluded that high degrees of physical asset specificity are one reason why vertical integration is preferred in the aluminum industry.

Thus, physical asset specificity binds parties together due to the uniqueness of the assets associated with the relationship. In general, the more unique the tasks, equipment, materials, etc. associated with the transaction, the higher the physical asset specificity.

Dedicated asset specificity refers to assets which "are put in place contingent upon particular supply agreements and, should such contracts be prematurely terminated, would result in significant excess capacity" (Williamson, 1983, p. 526). Dedicated assets are those resources that are contingent on timing issues in the agreement between parties. Heide and John (1988) found that firms safeguard dedicated resources (i.e. the time to learn the principal's business) by leveraging their dependency on relationships where asset specificity is high. Their results indicate that when sales agencies have relationship-specific assets with manufacturers, they balance this dependency on manufacturer firms by making offsetting asset investments in customer-agency relationships. This type of dependence

"leveraging" protects their relationship-specific assets from the principal and determines the type of economic exchange.

In addition, Joskow's (1987) study of coal contracts shows that as relationship-specific investments become more important, parties will find it advantageous to rely on longer-term contracts where terms and conditions can be stated in detail rather than rely on repeated bargaining situations. He concludes that safeguarding dedicated assets results in contracts which cover longer periods of performance. Masten and Crocker's (1985) study of "take" or "pay" clauses demonstrates the importance of timing, with respect to delivery of the products, in how contingency clauses are used to protect dedicated assets

Consequently, the length of time both parties are bound together through the contract is also a determinant of asset specificity. The longer the contract period, the more assets are likely to be relationship-specific due to uncertainty in the environment and bounded rationality of the parties. Crocker and Reynolds (1993) found that as seller's recovered their capital investments over the life of the contract, the size of relationship-specific assets remaining declines, which leads to a reduction in the duration of the contract. As relationship-specific assets increase, so does the completeness of the contract to safeguard those assets. As contracts evolve, assets tied to a particular transaction or contract lose value when that relationship is ended.

The literature suggests that human asset specificity also effects choice of governance structure. Human asset specificity refers to transaction-specific know-how accumulated by parties through long standing transactor relationships (Dyer, 1993). The author measured human asset specificity by the number of 'man-days' that the supplier and

automaker spent in face-to-face contact, the number of shared engineers and the extent they shared information. He found that human asset specificity predicted type of institutional agreement and discriminated between Japanese and American automaker-supplier relationships. Human asset specificity has been found to be a determinant of the type of economic exchange in many studies and across many industries (Masten, Meehan and Snyder, 1989; Pisano, 1989; John and Weitz, 1988). Consequently, future research on TCE theory must consider the dimension of human asset specificity.

In summary, physical, dedicated and human asset specificity are all variables of asset specificity. The literature reveals that each variable is valuable in discriminating between choice of governance structures. Consequently, one would expect to see significant differences in how asset specificity affects the choice of contract type since each type represents a different form of governance structure.

Uncertainty

The type of uncertainty is also important in the determination of governance structure. Walker and Weber (1984, 1987) found that different types of uncertainty affect the vertical integration decision in different ways. Their results indicate that production volume uncertainty, or changes in the number of units produced, is significant in determining the make decision when supplier competition is low. Technological uncertainty has no influence on make or buy decisions when supplier competition is low

but leads to a buy decision when competition is high. Thus, firms protect themselves from seller opportunism differently depending on the type of uncertainty experienced.

Harrigan (1986), in contrast, found that sales variability, a measure of risk and technological uncertainty, decreases the likelihood of vertical integration because of the added risks inherent in integrating another firm's production resources. Thus, technological uncertainty may be a reason to avoid internalization as it may make the costs of locking in a technology greater than the benefits of scale or scope (Helper, 1991). Firms that perceive higher levels of uncertainty will want to maintain flexibility in their exchange relationship to react to contingencies. Consequently, the higher the uncertainty in a relationship, the more cost-plus contracts would be pursued. Contract types will be discussed later in this chapter.

The use of sales variability by Harrigan is similar to how John and Weitz (1988) and Crocker and Reynolds (1993) define environmental uncertainty. John and Weitz (1988) found a positive relationship between asset specificity, uncertainty and performance assessment and the use of direct channels. The authors used an exogenous variable called environmental uncertainty which measured changes in sales forecasts and trends. Crocker and Reynolds (1993) also found that environmental uncertainty, the number of calendar quarters between completion of contractual negotiations and beginning product delivery, is a positive factor in the type of contract chosen. Thus, some measure of exogenous uncertainty relative to the transaction is important in the choice of governance structure.

Cost uncertainty is also a factor in the choice of governance structure. Cost uncertainty is the most important factor in influencing the choice of contract type according to Scherer (1964). Templin (1988) demonstrated that cost sharing terms in contracts are important indicators of cost uncertainty. He found that cost uncertainty positively impacts Just-In-Time (JIT) implementation and reflects the amount of perceived control by the buyer over the seller. However, his results most likely indicate the efforts of sellers to identify and reduce cost uncertainty through implementation of JIT activities since the contracts he studied were production contracts (i.e. FFP contracts). Thus, his research supports the concept that lower levels of uncertainty are associated with fixed-price contracts while higher levels of uncertainty are associated with cost-plus contracts. Therefore,

> H_1: Uncertainty will be higher for cost-plus contracts than fixed-price incentive contracts and firm-fixed price contracts.

Since this study is addressing R&D and low-production volume contracts, production volume uncertainty should not be a factor in the choice of governance structure. Consequently, the degree of environmental, technological and cost uncertainty are the most likely variables of uncertainty to affect contract type selection. Long-term contracts formulated in times of unstable environmental, technological and cost conditions should demonstrate higher uncertainty than contracts initiated under more stable conditions.

Contract Incompleteness

Due to unknown contingencies, some degree of contract incompleteness determines the type of contract used in an economic exchange. In general, contracts contain wording devised to protect the interests of buyer and seller. However, our knowledge of the important conditions that affect the degree of contract incompleteness and different types of contracts is limited.

An incomplete contract has been defined as "one that takes into account less than the available information to the parties which--in a world where no restrictions are imposed on contracts--it would be optimal for the parties to include" (Anderlini and Felli, 1994, p.1089). This definition exposes the importance of effectively stating the obligations of parties, the availability of extant information at contract start and anticipation of pertinent contingencies which may force contractual changes.

Contractual terms refer to those binding tasks the buyer and seller have agreed upon to adequately satisfy the contract. These terms typically describe the command structures and authority systems, incentive systems, standard operating procedures, dispute resolution procedures and pricing of a contract (Stinchcombe, 1985). According to Masten and Crocker (1985), there are two primary functions of contractual terms: 1) they permit parties to establish a division of the gains and 2) they determine the performance incentives in force during execution of the agreement. The extent obligations of parties to the contract are documented is one indication of contract completeness.

Consequently, contract incompleteness is comprised of the extent to which contract terms are *not* stated in detail.

However, drafting complete agreements becomes difficult when the possibilities are more numerous and the time of performance remote (Crocker and Reynolds, 1993). As the number of contingencies rises, it becomes more difficult to capture all possible contractual scenarios. Hackett (1993) states that contract incompleteness results when some terms are left unspecified, usually as a result of practical difficulties in specifying contingent responses to unforeseen future states of the world. Posner (1992) adds that the costs of adding details will become so large that it sufficiently prohibits the parties from writing a complete contract.

The inability to write a complete contract ultimately leaves parties with the choice of ignoring future contingencies as they arise, thereby saving costs, or to change the contract in adapting to these contingencies, thereby, increasing total costs. In the former case, adaptation is of less value than stability. These are situations commonly found when information is known about the production article and risk is low (i.e. a FFP contract type). However, in the latter case, adaptation through contract changes is very important when uncertainty is high and little is known about the product. Normally, flexibility to react to future contingencies is more valuable than maintaining a negotiated program cost.

As contracts become more complete over time fewer contractual changes are necessary to adjust to unknown but decreasing numbers of future contingencies. Therefore, the number of contract changes should be less in stable environments using FFP contract types than in unstable environments using CPFF contract types. With regard

to innovation, when product design requirements are not jointly approved by buyer and seller, then this the development process is unstable. In contrast, production phases typically have firm design specifications which lead to stable environments. Thus, FFP contracts should be more incomplete than other contract types. Therefore,

> H_2: Contract incompleteness will be higher for cost-plus contracts than fixed-price incentive contracts and firm-fixed price contracts.

Contract Type

Research has shown that the type of contract used in an economic exchange varies according to the degree of complexity of the transaction dimensions (Crocker and Reynolds, 1993). MacNeil (1978, p. 865) argues that "two common characteristics of long-term contracts are the existence of gaps in their planning and the presence of a range of processes and techniques used by contract planners to create flexibility in lieu of either leaving gaps or trying to plan rigidly." This range of contract alternatives has led to a variety of contract types depending on the complexity of the transaction dimensions. The more complex the transaction, the more the expectations of buyer and seller need to converge (Williamson, 1975). For instance, TCE theory posits that hierarchical structures are a form of last resort in high uncertainty transactions whereas market-like structures reflect less uncertainty.

However, in hybrid forms, relationships have varying degrees of hierarchy-like dimensions. Stinchcombe (1985) has provided five "Hierarchical elements" that describe this extreme position. A contract contains: 1) command structures and authority systems,

2) incentive systems which influence the seller's discretion, 3) standard operating procedures, 4) dispute resolution procedures and 5) pricing of variations of performance especially based on contractor costs. Stinchcombe (p. 156) further states that an economic exchange with these elements and "subunits whose 'price' is determined mainly by costs, is quite near to what we have described above as a typical 'hierarchy.'" Therefore, these elements of a hierarchy expose the issue of control which buyer and seller barter for in the terms of the contract. The more control mechanisms put into the contract, the more restrictive and hierarchical the contract is with respect to the rights of buyer and seller.

The most restrictive and complete contract, according to Crocker and Reynolds (1993), is the Firm Fixed-Price (FFP) type of contract (see Figure 2-2). In this type of contract, the price for the seller's work is not adjusted after award, regardless of the seller's actual cost experience. The only exceptions are for contract modifications and adjustments under the contract provisions such as the application of liquidated damages and adjustment for defective workmanship and material (Brittelli, Lynch and Emmelhainz, 1983). Because there is no adjustment in contract price after the work is completed, the cost uncertainty to the seller is high. Normally, this type of contract is used when technical and schedule uncertainty is low. Therefore, a fixed-price type of contract is appropriate when specifications are firm and when a price can be fairly and reasonably determined at contract formulation. Consequently, fixed-price contracts for well-specified items are akin to a market system transaction (Peck and Scherer, 1962; Templin, 1988; Crocker and Reynolds, 1993).

A variation of the FFP contract is the Fixed-Price with Economic Price Adjustment (FP/EPA) contract. The FP/EPA contract is used to recognize economic contingencies, such as unstable labor or market condition, that would prevent the establishment of a FFP contract. Technical and schedule uncertainty are typically low as the article being produced is fairly well-known. Consequently, the FP/EPA agreement is simply a FFP contract that includes economic price adjustment clauses that are negotiated at the beginning of the contract. Thus, the FP/EPA and FFP contracts are so similar in content and format, differentiating between the two does not add much value.

When future contingencies are not quantifiable enough to determine price, parties may seek flexibility by adopting a cost-sharing arrangement designed to give the seller an incentive to control costs. There are three variations of this contract arrangement: the Fixed-Price Incentive (Firm) (FPIF), Fixed-Price Incentive (Successive) (FPIS) and Cost-Plus Incentive Fee (CPIF). The FPIF contract is used in instances where uncertainty cannot be reduced to a level acceptable for use of an FFP contract, yet it is not great enough to warrant a cost type of contract (to be discussed in next section). The important assumption is made that the product has been defined and understood by both parties and contract terms and conditions have been agreed upon.

The FPIS contract is designed for situations involving the acquisition of the first or second production unit of a newly developed item. According to (Brittelli, Lynch and Emmelhainz, 1983), "long-lead time requirements may make it necessary, in the acquisition of a new system, to contract for a follow-on quantity before design and production stability have been achieved." Crocker and Reynolds (1993) found that FPIS

contracts were the more incomplete than other contract types discussed so far because the number of contingencies requiring attention is so great that is difficult for sellers to insure against cost uncertainty. Therefore, FPIS contracts are used infrequently given the considerable amount of uncertainty associated with the transaction.

Another type of incentive contract is the CPIF contract. A CPIF arrangement is used where the cost uncertainty warrants a cost type contract (buyer incentivizes lower costs) but where an incentive can be established to provide the seller with positive motivation to control costs. CPIF contracts are most appropriate for complex economic exchanges where initial production runs are attainable. In this situation, uncertainty is too high to warrant other types of contracts.

Thus, the three incentive-type contracts recognize the presence of cost, technical and schedule uncertainty with the goal of minimizing seller costs. Therefore, fixed-price and cost incentive contracts fall in-between fixed-price and cost-plus type of arrangements with regard to contract completeness, uncertainty and asset specificity.

Cost-Plus Fixed Fee (CPFF) and Cost-Plus Award Fee (CPAF) arrangements occur when the buyer assumes total cost responsibility. Under a CPFF contract, the buyer agrees to reimburse the contractor for all binding costs that are incurred during performance of the contract. According to Brittelli, Lynch and Emmelhainz (1983), the CPFF contract should only be used as a last resort and when the seller will accept no other arrangement. It is an appropriate type of contracting when the uncertainty is too high for the seller too assume. CPFF contracts are normally found in early development work when the level of effort is not quantifiable and production articles are in design infancy.

Because this type of arrangement is the choice of last resort, it has the most similarity with the hierarchical form of governance. Since there is so much uncertainty that characterizes the transaction, CPFF contracts are the most incomplete of all other contract forms because of the difficulty stipulating contractual terms, requirements and milestones. Consequently, buyers substitute "administrative control mechanisms and armies of auditors, plant representatives, etc. for market mechanisms" to counter higher levels of uncertainty (Peck and Scherer, 1962, p. 61). These mechanisms make CPFF the most hierarchy-like type of contract. Consequently, according to TCE theory, CPFF contracts should also demonstrate the highest asset specificity since higher asset specificity is associated with non-market forms of governance. Therefore,

> H_3: Asset specificity will be higher for cost-plus contracts than fixed-price incentive contracts and firm-fixed price contracts.

CPAF contracts differ slightly from CPFF contracts in that they are used to motivate the seller in areas such as management, responsiveness and creativity. The fee awarded is a subjective determination by the buyer regarding the seller's performance. Thus, CPFF and CPAF contracts are the most hierarchical in that they increase the bureaucratic burden of the exchange relationship and involve the most hierarchy-like mechanisms of control.

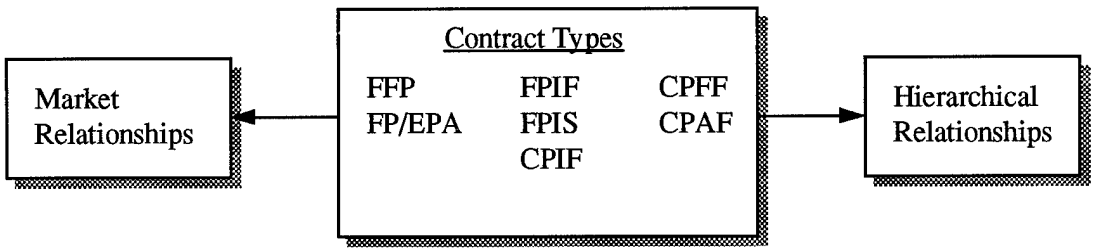
The following major hypothesis was used as the basis for developing subsequent sub-hypotheses based on the magnitude and directionality of each transaction dimension. This hypothesis and sub-hypotheses are based on the previous discussion of transaction

dimensions and type of contract. Many studies have shown that transaction dimensions affect types of contract differently. Thus, asset specificity, uncertainty and contract incompleteness should determine the type of contract chosen. CPFF contracts were shown to be high in hierarchy-like content while FFP contracts were shown to be low. Fixed-price and cost incentive contracts were somewhere in between. Therefore,

> H_4: Transaction dimensions will differentiate cost-plus contracts, incentive type contracts and firm-fixed price contracts.
>
> H_{4a}: Asset specificity will be an important discriminator in differentiating contract type.
>
> H_{4b}: Uncertainty will be an important discriminator in differentiating contract type.
>
> H_{4c}: Contract incompleteness will be an important discriminator in differentiating contract type.

Figure 3-1 shows a continuum of hierarchical relationships based on contract type. FFP and FP/EPA contracts are virtually the same with regard to completeness and levels of risk that characterize the transaction. Consequently, these market-like types of contracts exhibit a low degree of "Hierarchical Content" as proposed by Johnston (1993). Consequently, FFP and FP/EPA contracts are referred to as "Low Hierarchy Types of Contracts." FPIF, FPIS and CPIF arrangements display intermediate forms of hierarchical content and are termed "Moderate Hierarchy Types of Contracts." CPFF CPAF contracts are "High Hierarchy Types of Contracts" based on their higher administrative controls and weak incentive structures. The three hierarchical types are proposed as different forms of governance in complex economic exchanges.

Figure 3-1: Continuum of Contract Types as Hybrid Forms of Governance



The Continuum of Exchange Structures

Performance

The second model proposed in this study is the evaluation of performance differences due to contract type. One of the limitations of previous studies has been that actual performance data was either not used or not available. Consequently, many partial proxies have been used to measure the performance of different governance structures. For instance, executives were asked how they perceived the value of a relationship in a recent transaction (Johnston, 1993) and other studies have addressed inventory costs (Dyer, 1993) or selling costs (Heide and John, 1988). While important, these proxies are themselves incomplete as they do not capture total costs nor the scope of efficiency in a complex economic exchange.

Consequently, measures which capture "total cost" concerns, quality concerns and schedule should be used to evaluate the performance of different governance structures. In fact, Williamson's (1975) main hypothesis is that hierarchies and markets differ in how they incentivize coordination of work schedules, achievement of product quality and maintenance of program costs.

One can expect contract types to vary on each of these variables. For instance, firm-fixed price contracts have stronger incentives than other contract types in that they tightly link consequences to outcomes. In other words, the seller is incentivized to perform since the price paid is known up-front at contract formulation. The seller's incentive to complete the contract as quickly as possible is maximized since the seller's return is known and non-negotiable. Therefore, the seller's performance should be better than other contract types since the probability of successfully finishing the contract is high.

In contrast, CPFF type contracts have the weakest incentives. The seller does not assume cost responsibility as the buyer assumes total cost risk. Consequences of seller actions are not tied to contractual outcomes since the seller is reimbursed for the costs of the contract regardless of the outcome in most situations. Program schedule growth is common since the seller receives payment regardless of delivery. Thus, performance suffers since the seller is not motivated to complete the work. As contingencies develop, contract costs increase up to the limits of buyer resources, which is unknown and varies year to year, ultimately limiting seller performance.

FPIF, FPIS and CPIF arrangements, however, have intermediate levels of incentive intensity. While such contracts permit parties to operate under moderate levels of risk, it

comes with an added bureaucratic burden of adjusting prices based on seller's share of the costs. According to Crocker and Reynolds (1993), the "cost-sharing formula under which overruns are partially borne by the seller serves as a partial brake on efforts to inflate price." Thus, these types of contracts offer some protection against seller cost increases and the moderate levels of risk associated with the transaction. However, these types of contracts still experience cost growth since uncertainty is moderate due to the added number of contingencies that must be addressed. This normally results in schedule slips to account for unknown contingencies. Therefore,

> H_5: Cost-plus contracts will differ from fixed-price incentive contracts and firm-fixed price contracts on the set of performance dimensions.
>
> H_{5a}: Cost-plus contracts will be greater than fixed-price incentive contracts and firm-fixed price contracts on change in total cost.
>
> H_{5b}: Cost-plus contracts will be greater than fixed-price incentive contracts and firm-fixed price contracts on change in program schedule.
>
> H_{5c}: Cost-plus contracts will be lower than fixed-price incentive contracts and firm-fixed price contracts on program quality.

Summary

The underlying hypothesis of this research, based on transaction-cost economics theory, is that transaction dimensions determine the choice of governance arrangement. An important implication of this hypothesis is that cases where a mismatch occurs between

the transaction dimension and governance arrangement--the type of contract utilized--are anomalies and lead to substandard performance (i.e. less efficiency).

To test this hypothesis and its implications, governance constructs were developed and traditional ones modified to form a new research model (see Figure 3-2). The governance construct evaluated in this study is the type of contract used in complex economic exchanges. The transaction dimension set includes asset specificity, uncertainty and contract incompleteness. Three performance constructs were developed, one based on change in costs, another based on the affect on quality and the last on the change in program schedule. A related research model that represents performance affects due to contract type is also included in Figure 3-2.

Hypotheses are listed in Table 3-1. While previous research has assumed that the choice of contract type is dependent on uncertainty, asset specificity and contract incompleteness, these dimensions have been inadequately tested in previous research. Consequently, the goal of this research is bridge this gap. The contract incompleteness construct itself is a contribution--it incorporates both economic and contracting streams of literature. The research model is also a contribution and will be tested using archival data from a DoD procurement service. The use of actual performance data should add greatly to previous research that has relied on self-reported data. The next chapter discusses the research design and measures for testing these hypotheses.

Figure 3-2: Conceptual Model of Governance Dimensions

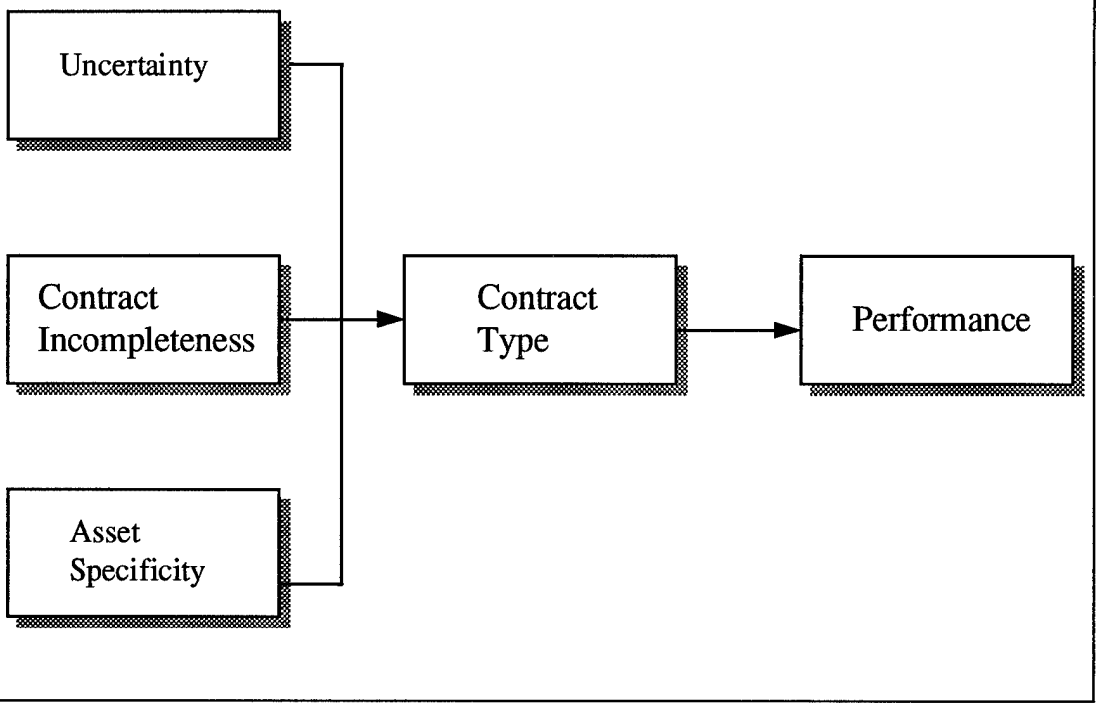


Table 3-1: Listing of Hypotheses

H1: Uncertainty will be higher for cost-plus contracts than fixed-price incentive contracts and firm-fixed price contracts.

H2: Contract incompleteness will be higher for cost-plus contracts than fixed-price incentive contracts and firm-fixed price contracts.

H3: Asset specificity will be higher for cost-plus contracts than fixed-price incentive contracts and firm-fixed price contracts.

H4: Transaction dimensions will differentiate cost-plus contracts, fixed-price incentive contracts and firm-fixed price contracts.

H4a: Asset specificity will be an important discriminator in differentiating contract type.

H4b: Uncertainty will be an important discriminator in differentiating contract type..

H4c: Contract incompleteness will be an important discriminator in differentiating contract type.

H5: Cost-plus contracts will differ from fixed-price incentive contracts and firm-fixed price contracts on the set of performance dimensions.

H5a: Cost-plus contracts will be greater than fixed-price incentive contracts and firm-fixed price contracts on change in total cost.

H5b: Cost-plus contracts will be greater than fixed-price incentive contracts and firm-fixed price contracts on change in program schedule.

H5c: Cost-plus contracts will be lower than fixed-price incentive contracts and firm-fixed price contracts on program quality.

Chapter 4

Empirical Research

In the previous chapter, hypotheses were developed from transaction-cost and contracting theory. This chapter presents an empirical research design to test these hypotheses. Included is a discussion of operational measures, research design, research setting, reliability and validity issues pertinent to this study.

Operational Measures

When applicable, previously developed concepts have been used as the basis for this analysis. This study is one of the first to address how asset specificity, uncertainty and contract incompleteness differ by contract type. A second set of measures concerns how performance differs by contract type.

Asset Specificity

Asset specificity was measured by three variables: physical, dedicated and human (see Table 4-1). Physical asset specificity has been measured in previous research as the percentage of R&D firms expended divided by firm sales (Levy, 1985; Armour and Teece, 1980), percentage of boat fuel and bait shared by fisherman and lobster operators (Acheson, 1985), the degree of specially designed rail cars for automotive and chemical

customers (Palay, 1984) and the use of use of unique tool dies in manufacturing (Evanchik, 1989; Argyres, 1993). Consequently, since this study is evaluating transaction-cost theory based on the uniqueness of the economic exchange, physical asset specificity is defined as the percentage of final contract value expended divided by seller firm sales in the year the contract was completed.

Dedicated asset specificity refers to those relationship-specific assets that are contingent on the timing of their use. Heide and John (1988) found that firms offset the time to learn the principal's business, their measurement of asset specificity, by leveraging this dependency with other customers. In addition, Joskow's (1987) study shows that relationship-specific investments increase the time contracts are in force. Thus, one form of dedicated asset specificity is the time to dispose of excess coal at a fair price once coal is purchased. Masten and Crocker's (1985) study of "take" or "pay" contract clauses demonstrates the importance of the delivery of the assets and payment for those assets. The authors use excess demand for natural gas as a proxy for dedicated asset specificity.

Crocker and Reynolds (1993) found that as seller's recovered their capital investments over the life of the contract, the size of relationship-specific assets remaining declines, which leads to a reduction in the duration of the contract. Thus, dedicated asset specificity is greater at contract start date than at contract close-out. For this study, dedicated asset specificity is defined as the time to learn the buyer's requirements from contract start date to acceptance of product (signing of DD Form 250). In essence, product learning ceases at this point in the innovation cycle.

Human asset specificity has been measured in many ways. Dyer (1993) used the

number of 'man-days' that the supplier and automaker spent in face-to-face contact, the number of shared engineers and the extent they shared information as measures of human asset specificity. Other studies have also found human asset specificity to be a determinant of governance structure. Masten, Meehan and Snyder (1989) used measures of transaction-specific know-how in the decision to integrate production within a automaker firm. Pisano (1989) coded firms as either R&D or manufacturing to represent transaction-specific know-how. R&D represents collaborative efforts that indicate high asset specificity. John and Weitz (1988) measured asset specificity by the time it takes for an experienced person to become familiar with new products and customers. Thus, human asset specificity is measured by the total contractual labor hours required by the seller to complete the contract. This measure indicates the nonredeployable skills required for a relationship.

Table 4-1: Operationalization of Asset Specificity Measures

Asset Spec. Variables	Description of Variables
PHYSICAL	Final contract value divided by seller-firm sales in the year the contract was completed.
DEDICATED	Time to learn buyer's requirements (i.e. the time in months between contract start date and acceptance of product).
HUMAN	Total contractual labor hours required by seller to complete the contract.

Uncertainty

The inability to predict unforeseen contingencies is represented by three uncertainty variables: environmental, technical and cost (see Table 4-2). Walker and Weber (1984, 1987) found that production volume uncertainty, or changes in the number of units produced, is significant in determining the make decision when supplier competition is low. Technological uncertainty, the frequency of specification changes, has no influence on make or buy decisions when supplier competition is low but leads to a buy decision when competition is high. Technological uncertainty is measured in this study as the total cost of engineering specification changes divided by the number of engineering changes. This should indicate the relative uncertainty associated with different contract relationships.

Harrigan (1986), in contrast, found that sales variability, a measure of technological uncertainty, decreases the likelihood of vertical integration. John and Weitz (1988), in contrast, found a positive relationship between uncertainty, the change in sales forecasts and trends, and form of governance. Crocker and Reynolds (1993) also found that environmental uncertainty, the number of calendar quarters between completion of contractual negotiations and beginning product delivery, is a positive factor in the type of contract chosen. Consequently, environmental uncertainty is measured by the average change in firm sales per year between contract start and end date. This factor should reflect exogenous factors which impact the contractual relationship.

Cost uncertainty is also a factor in the choice of governance structure. Cost uncertainty is the most important factor in influencing the choice of contract type according to Peck and Scherer (1962) and Scherer (1964). Templin (1988) also demonstrated that cost sharing terms in contracts are important indicators of cost uncertainty. Therefore, cost uncertainty is measured by the buyer's cost-share ratio as stated in the contract. This reflects the buyer's assessment of the cost risk associated with the economic transaction.

Table 4-2: Operationalization of Uncertainty Measures

Uncertainty Variables	Description of Variables
TECH	Total cost of engineering changes divided by number of engineering proposals between contract start and end date.
ENVIRON	The average change in firm sales per year between contract start and end date.
BUYCOST	The buyer's cost-share ratio as stipulated in the contract.

Contract Incompleteness

The concept of contract incompleteness is central to transaction-cost theory as discussed in the literature review. The measurement of contract incompleteness has been assumed to match the type of contract that results when buyer and seller negotiate terms and conditions of the relationship (Crocker and Reynolds, 1993). However, contract incompleteness may or may not match the form of economic exchange due to three things:

1) the best a contract can offer is to state *average* requirements, terms and conditions (Al-Najjar, 1995; Stinchcombe, 1985) which means there is room for opportunism and, hence, less efficiency, 2) the contract may not include up-to-date information which limits the performance of parties to the contract (Anderlini and Felli, 1994) and 3) our knowledge of the important conditions that affect the degree of contract incompleteness and different types of contracts is limited (Hackett, 1995; Posner, 1992). Consequently, this study measures contract incompleteness on three variables (see Table 4-3): 1) the number of tasks identified in the contract (reverse scored), 2) the depth tasks are delineated in the contract (reversed scored) and 3) the number of changes required to handle contingencies. The fewer the number of contingencies, the more complete the contract. These measures are consistent with past research on government contracts (Adler, 1994).

Table 4-3: Operationalization of Contract Incompleteness Measure

Contract Incompleteness Variables	Description of Variables
COMPLEX	The number of statement of work paragraphs in section 3.0 (tasking section) of the contract.
EXPLICT	The average number of lines per statement of work paragraph in section 3.0 or 4.0 (tasking section) of the contract.
DESADD	The total number of engineering changes between contract start and end date.

Performance

Performance has been measured by many different variables in previous studies. Profitability, cost and duration have all been identified as variables of performance. For instance, Dyer (1993) found that Japanese and American governance structures differed and were determined by the level of inventory holding costs and profitability over a ten-year period. In contrast, Heide and John (1988) used a negatively scaled measure for performance. This measure was made up of selling costs of a product line divided by the commission income generated by the agency to sell the product. Walker and Poppo's (1991) study showed that internalization led to lower transaction costs than buy relationships.

Masten and Crocker (1985) and DeCanio and Frech (1993) used actual contract price for natural gas to determine the relative performance of contract provisions. Longer-term relationships provided lower prices than spot-market transactions (Joskow, 1988). Thus, this study addresses how cost, quality and duration (schedule) all differ by contract type (see Table 4-4). Cost is measured by the change in contract costs. Quality is measured by the change in test and evaluation costs. The reasoning here is that test and evaluation is the feedback mechanism on the product design process. Consequently, if test and evaluation increases, this indicates an inefficient structure since products have to be repeatedly retested with new or modified designs. Schedule is measured in the difference between the original contract schedule and the actual schedule. Consequently, cost, quality and schedule should indicate the relative performance of different contract types.

Research Design

Research Method

A majority of the transaction-cost literature relies on survey data. While survey data offer several advantages to data collection and analysis, they are subject to the respondent's reconstruction of events. Since an individual's memory is sometimes distorted and even fails (Calsyn, 1993), survey methods may not capture actual events and characteristics of events, especially in complex economic transactions.

Table 4-4: Operationalization of Performance Measures

Performance Variables	Description of Variables
COSTPERF	The difference in costs between original and final total contract cost divided by the negotiated cost.
QUALPERF	The difference between original test and evaluation costs and actual test and evaluation costs divided by total contract cost.
SCHDPERF	The difference between the original contract completion date and the actual contract completion date divided by negotiated contract completion date (in months).

Consequently, this research design uses an archival method to gather and analyze data. This data comes from actual contract files that have been completed and stored in USAF procurement agencies. Archival research methods are advantageous in that data is documented and available. For instance, archival methods use primary-source data, not secondary source as in self-reported data. Kerlinger (1986, p. 621) observes that "if the

precept of the primary source were taken more seriously, fewer erroneous generalizations would gain currency." The data proposed in this study come from public records found in federal R&D contracts between the U.S. government and prime contractors. This data tends to be accurate and complete.

Research Models

This research design develops two research models. Both models are depicted in Figure 3-2 and will be used to determine which variables produce differences in type of contract.

Discriminant analysis will be used to test the first model since it answers questions of how transaction dimensions (i.e. predictors) can be combined to predict contract type (group membership). In this design, we are testing whether the transaction dimension set of uncertainty, asset specificity and contract incompleteness produce reliable differences on contract type (the grouping variable). Once the combination of variables are identified that predict contract type, the second model will address differences in performance due to contract type. Consequently, a MANOVA model will test for these differences. Each model is discussed in more detail in the following section.

With regard to the first model, other models besides discriminant analysis may seem more appropriate. For instance, logit analysis might seem to be appropriate to use since it relies on categorical data. However, logit analyses typically depends on frequency

count data (Stevens, 1992), not continuous data. Since the predictor variables in this design are continuous, logit and other log linear models are not appropriate.

On the other hand, discriminant function analysis is an appropriate method to test this model. Tabachnick and Fidell (1989) observe that if the answer to whether predictors can be combined to predict group membership is yes, then the model of choice is discriminant function analysis. This type of analysis is appropriate because the classification variable, contract type, is dependent on the predictor, or discriminating, variables of asset specificity, uncertainty and contract incompleteness. The classification variable is type of contract which is consistent with transaction-cost theory because efficiency of governance structure is the central question. Contract type can take on one of three outcomes--1=Low Hierarchical Type Contract, 2=Moderate Hierarchical Type Contract and 3=High Hierarchical Type Contract.

Thus, for each significant discriminant function, within-group correlations will be evaluated to see which transaction dimensions are significant and contribute the most. Stevens (1992) recommends a .25 cutoff for accepting significant correlations. Correlations above .7 are large while those in the .25 to .35 range are weak. Of those that are significantly correlated, their respective canonical coefficients will then be compared to see which are redundant. Dimensions with medium to large coefficients will be retained. Finally, the group centroids will be analyzed to see how groups differ on significant transaction dimensions in magnitude and directionality. Thus, this analysis should provide answers to hypotheses 4 and sub-hypotheses 4a through 4c. To address hypotheses 1

through 3, univariate F-tests will be performed to assess differences in magnitude and direction.

The second model addresses hypothesis 5 and sub-hypotheses 5a through 5c by measuring the relationship between performance and contract type. It is hypothesized that performance varies by contract type. This model will address cost, quality and schedule concerns using a three-group, MANOVA design. There will be three groups since there are three contract types. According to Tabachnick and Fidell (1989, p. 371), "MANOVA tests whether mean differences among groups on a combination of dependent variables are likely to have occurred by chance." MANOVA is used in this study to ask whether a combination of the three performance measures--cost, schedule and quality--varies as a function of contract type. Thus, this model differs from discriminant function analysis because in this study the dependent (predictor) variables are the performance measures and the independent (grouping) variables are types of contracts. This relationship is the later part of the model presented in Figure 3-2.

In this MANOVA analyses, the main questions are 1) does performance vary by contract type and 2) if differences are found, then to conduct post hoc procedures for "locating significant pairwise differences, both multivariate and univariate" (Stevens 1992, p. 196). Planned comparisons for proposed major hypotheses and follow-up post hoc tests of the differences between contract type means using Mahalanobis' D^2 are proposed in the multivariate context to determine which of the contract types are significantly different from each other on the performance variables. Pairwise comparisons will be used to determine which pairs of contract types differ significantly on the performance

variables. To keep power in control, this study will keep each pairwise test at an alpha of .025 (overall alpha of .1 divided by 4 pairwise tests). The pairwise procedure has the best power considerations of other methods available. Tukey's procedure will be used because it compares all pairwise contract type differences.

This analysis attempts to determine differences on the linear combination of the performance variables for each contract type by comparing the squared distances between means on the combined variable, or centroid, for each contract type (group) (Tabachnick and Fidell, 1983).

A second analysis will be performed to determine the individual contribution of each dependent variable to the overall model. Univariate F tests will be performed on each dependent variable to assess the unique contributions of individual dependent variables. If a univariate F is significant, then a planned comparison will be used for contract types hypothesized to be different or follow-up post hoc comparisons.

In accordance with other appropriate checks of linear regression procedures, evaluations of design assumptions (e.g., testing for multicollinearity, linearity, normality, homogeneity of variance-covariance) will be conducted and investigated (Lewis-Beck, 1980; Neter, Wasserman and Kuntner, 1983; Stevens, 1992).

Research Setting

The research setting chosen for this study is the Air Force Material Command (AFMC). AFMC is located in Dayton, Ohio, at Wright-Patterson Air Force Base and has

been a research center for aircraft systems since flight was initially conceived and demonstrated. AFMC serves as the R&D and production center for Air Force weapon system acquisitions. Most aircraft and missile development programs have been conceived and managed there. AFMC normally works in conjunction with operational commands to determine what needs exist and how to best proceed in designing, developing and producing new weapon systems. When the Air Force's general needs are understood adequately by AFMC, AFMC formulates and negotiates a contract with a prime contractor to develop and produce the weapon system.

Contracts representing these efforts are closed out once systems are delivered. This study includes contracts that are closed out or close to being closed out. Contract files should contain all legal and performance data that occurred during the life of the contract. Thus, these files are rich sources of information regarding how complex economic exchanges are structured and how they affect performance.

Closed-out and physically complete AFMC contract files are located in one of five places: two locations on Wright-Patterson Air Force Base and three locations where federal records are stored. These three locations are in 1) Moraine, Ohio, 2) St. Louis, Missouri and 3) Washington D.C. Contracts located in St. Louis and Washington D.C. can be ordered for review given a month's lead-time.

Appendix A is my letter to the head of AFMC contracting requesting permission to conduct this research. Appendix B contains AFMC/PK's letter granting this permission and allowing access to these contract files. Appendix C contains an initial listing of the contract files by contract type (i.e. CPFF, Incentive-Type and FFP contracts). Contracts

that are active or delinquent were not included in this sample because final performance would not be known. Contracts chosen for study are from the DoD AMIS database as manipulated from Wright-Patterson AFB's contracting division The total number of fixed-price, incentive and cost-plus contracts in the AMIS database is 11,058 contracts. However, this study is only including contracts that are closed out or close to being closed out in order to evaluate performance data (i.e. closed-out, physically complete, inactive, ready for retirement or retired). Differences between these descriptions are mainly administrative in function relating to administrative requirements of the contracting process. For our purposes, these differences are minor and all contracts selected for study can be considered complete.

The total number of complete contracts is 8,672 between the period of 1970 to 1993. This timeframe is large enough to get enough incentive-type contracts for study. The total population of complete contracts includes 4,091 firm-fixed price, 142 incentive and 4,439 cost-plus contracts. This study will include a sample of 100 fixed-price representing 2.4% of the population, 100 incentive representing 70.4% of the population and 100 cost-plus contracts representing 2.3% of the population. Overall, this study represents 3.5% of the population of complete contracts. The dollar magnitude of these contracts fall in the $50,000 to $5 billion range. Contracts were selected at random using a random number lookup table to reach up to 100 contracts in each contract type.

Reliability

Reliability "describes the extent to which two sets of measurements of the same characteristic" on the same subject duplicate each other. It assists us in measuring the "goodness" of a measure by assessing the consistency or stability of the instrument (Light, Singer and Willet, 1990). Stability refers to the ability of a measure to maintain consistency over time and despite uncontrollable testing conditions.

Reliability issues are not problematic in this research design because the data gathered will not be subject to the interpretation of events by individuals. Instead, data will be gathered based on characteristics of the contract (i.e. number of paragraphs in the work statement, the number of change proposals to the contract, etc.). These measures are objective and should be stable and consistent across contracts. I will be the primary data gatherer and evaluator in this study. However, since gathering this data does not involve interpretation on my part, reliability concerns should not be an issue in this design.

Validity

Nomological, Construct and Predictive Validity

Validity describes how well a measure actually assesses what you want it to measure (Light, Singer and Willet, 1990). There are several kinds of validity pertinent to this research design (Schwab, 1980): nomological, construct and predictive.

Nomological validity refers to how well the research constructs are grounded in theory. In this design, the concept of governance structure is grounded well in theory and other empirical research. Long-term contracts as "hybrid" structures is based on theory and has been empirically researched (Peck and Scherer, 1962; Williamson, 1991; Stinchcombe, 1985; Crocker and Reynolds, 1993).

Construct validity refers to the degree to which a measure actually assesses the underlying theoretical construct it is supposed to assess. Measures used in this study are based on theory and empirical research. The operationalization of "Contract Incompleteness" is based on its central meaning in transaction-cost theory and its importance in choice of economic exchange.

To establish predictive validity, a construct must be able to predict a dependent variable. Predictive validity should be possible given that contract type will be predicted by degree of asset specificity, uncertainty and contract incompleteness. In addition, the level of performance will be then be predicted by type of contract. Comparisons will be made between contract type in predicting performance and in understanding the degree of hierarchical content in determining contract type.

Internal and External Validity

Other work by Campbell and Stanley (1963) suggest that validity can be broadly divided into internal and external. Stevens (1992) defines internal validity as the degree of confidence that the treatments used in the research design can be determined to cause the respondents to differ. Consequently, threats to internal validity include history,

maturation, testing effects, instrumentation, statistical regression effects, selection effects, mortality and selection-maturation effects. Estimating internal validity is a deductive process in which the researcher has to be critical of the research design. Only when all the relevant threats have been ruled out can we have confidence in our logistic regression results.

The primary threat to internal validity in this study includes selection effects in how to acquire an unbiased number of contracts in each type. Understandably, getting a large enough sample size in the three contract types for equal cell size is a goal of this design but probably not realistic. Consequently, all contracts that can be evaluated will be evaluated up to a n=250. In addition, contract file location has no affect on what is being measured and, thus, the threat to internal validity should be low.

Cook and Campbell (1979) state that external validity refers to the approximate validity with which we can infer that the presumed causal relationships can be generalized to and across alternate measures of cause and effect. In this regard, external validity refers to the correspondence between available samples, the populations they represent and the populations to which we hope to generalize. Thus, a primary concern of the research design is to get adequate cross-validation of the research results to other populations. Basically, since statistical relationships are maximum for the sample from which it is derived, when the regression equation is applied to an independent sample from the same population (i.e. cross-validated), the predictive power drops off. If the predictive power drops off sharply, then the equation is of limited utility (Stevens, 1992).

The two key factors for measuring cross-validity are sample size (n) and the number of predictors (k). The n/k ratio indicates how generalizable is the resulting regression equation according to Park and Dudycha (1974). In their study, k and n determine how reliable the prediction equation is from one population to another. Their results indicate that a ratio of 10 to 15 subjects per predictor is needed for a reliable prediction equation. In this study, projected n=250, which includes the three types of contracts, and k=9 which includes measures three measures of asset specificity, uncertainty and contract incompleteness. The n/k ratio is 250/9 which equals 27.78.

Thus, by most accepted methods of evaluation, although details of the contract will change, research results from this study should be generalizable to other public sector settings with similar characteristics.

Summary

This research should increase our understanding of how incompleteness of contracts, uncertainty and relationship-specific assets in complex transactions affects the choice of governance structure. The major advantages of this research are its contribution to knowledge about governance theory, the development of two research models and the measure of contract type efficiency in predicting performance.

In addition, the use of actual performance data should add greatly to previous research that has relied on self-reported data.. Thus, pitfalls of self-reported data are avoided in this research which should also contribute to the study of transaction cost theory.

The data also has two messages for practitioners for remaining competitive: 1) recognize the key dimensions that lead to different contract types and 2) performance varies depending on the type of contract used. The extent of asset specificity, uncertainty and contract incompleteness determine the appropriate type of contract. Those contracts that match the degree these dimensions are present will most likely predict the degree of hierarchical content in the relationship.

Thus, performance varies by type of contract. Although a simple concept, these results should indicate that all transactions are not managed equally and that each leads to different results in an exchange relationship, thus supporting TCE theory. This research should also indicate that the type of contract employed is important for acquiring and maintaining desired competitive positions in exchange relationships.

References

Acheson, J. (1985), "The Maine Lobster Market: Between Market and Hierarchy," Journal of Law, Economics and Organization, (11), 385-398.

Adler, T. (1994), "The Innovative Process: Interpreting Customer Requirements," *IEEE Aeronautical and Electronic Systems*, (9), 17-25.

Alchian, A. (1950), "Uncertainty, Evolution and Economic Theory," *Journal of Political Economy*, (58), 211-221.

Al-Najjar, N. (1995), "Incomplete Contracts and the Governance of Complex Contractual Relationships," *American Economic Association Papers and Proceedings*, (85), 432-436.

Armour, H. and D. Teece (1980), "Vertical Integration and Technological Innovation," *Review of Economics and Statistics*, (62), 470-474.

Anderlini, L. and L. Felli (1994), "Incomplete Written Contracts: Undescribable States of Nature," *The Quarterly Journal of Economics*, November, 1085-1124.l

Argyres, N. (1993). "Essays on Technology, Strategy and Organization." *Ph.D. Dissertation*, University of California at Berkeley.

Arrow, K. (1969), "The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Nonmarket Allocation," In *The Analysis and Evaluation of Public Expenditure: The PPB System*, (1), U.S. Joint Economic Committee, 91st Congress, 1st Session, U.S. Government Printing Office, Washington D.C., 59-73.

Barnard, C. (1938). *The Functions of the Executive*. Cambridge, MA: Harvard University Press.

Blenkhorn, D. and A. Noori (1990), "What it takes to supply Japanese OEMs," *Industrial Marketing Management*, 19, 75-81.

Borys, B. and D. Jemison (1988), "Hybrid Arrangements as Strategic Alliances: Theoretical Issues in Organizational Combinations," *Academy of Management Review*, (14), 234-249.

Brittelli, J., P. Lynch and P. Emmelhainz (1983). *Principles of Contract Pricing*. Wright-Patterson Air Force Base, Ohio: Extension Course Institute.

Calsyn, R. (1993), "Can You Trust Self-Reported Data?," *Evaluation Review*, (17), 353-367.

Campbell, D. and J. Stanley (1963). *Experimental and Quasi-experimental Designs for Research.* Boston, MA: Houghton Mifflin.

Caves, R. and R. Bradburd (1988), "The Empirical Determinants of Vertical Integration," *Journal of Economic Behavior and Organization*, (9), 265-279.

Coase, R. (1937), "The Nature of the Firm," *Economica N.S.*, (4), 386-405.

Cook, T. and D. Campbell (1979). *Quasi-Experimentation: Design and Analysis Issues for Field Settings.* Boston, MA: Houghton Mifflin.

Crocker, K. and K. Reynolds (1993), "The Efficiency of Incomplete Contracts: An Empirical Analysis of Air Force Engine Procurement," *RAND Journal of Economics*, (24), 126-146.

Cyert, R. and J. March (1963). *A Behavioral Theory of the Firm.* Englewood Cliffs, NJ: Prentice-Hall.

DeCanio,S. and H. Frech (1993), "Vertical Contracts: Natural Experiment in Natural Gas Pipeline Regulation," *Journal of Institutional and Theoretical Economics*, (148), 484-504.

Donaldson, L. (1990), "The Ethereal Hand: Organizational Economics and Management Theory," *Academy of Management Review*, (15), 369-381.

Dyer, J. (1993). "Four Papers on Governance, Asset Specialization, and Performance: A Comparative Study of Supplier-Automaker Relationships in the U.S. and Japan." *Ph.D. Dissertation*, University of California at Los Angeles.

Eccles, R. (1981), "The Quasifirm in the Construction Industry," *Journal of Economic Behavior and Organization*," (2), 335-358.

Evanchik, M. (1989). "A Transaction Cost Analysis of Defense Contracting." *Ph.D. Dissertation*, University of Washington.

Fox, R. (1974). *Arming America: How the U.S. Buys Weapons.* Boston, MA: Harvard University Press.

Gansler, J. (1980). *The Defense Industry.* Cambridge, MA: The MIT Press.

Globerman, S. (1980), "Markets, Hierarchies and Innovation," *Journal of Economic Issues*, (14), 977-998.

Grossman, S. and O. Hart (1986), "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration," *Journal of Political Economy*, (94), 691-719.

Hackett, S. (1993), "Incomplete Contracting: A Laboratory Experimental Analysis," *Economic Inquiry*, (31), 274-297.

Hanson, G. (1995), "Incomplete Contracts, Risk and Ownership," *International Economic Review*, (36), 341-363.

Harrigan, K. (1986), "Vertical Integration and Corporate Strategy," *Academy of Management Journal*, (28), 397-425.

Hayek, F. (1945), "The Use of Knowledge In Society," *American Economic Review*, 35, 519-530.

Heide, J. and G. John (1988), "The Role of Dependence Balancing in Safeguarding Transaction-Specific Assets in Conventional Channels," *Journal of Marketing*, (52), 20-35.

Helper, S. (1991), "Strategy and Irreversibility in Supplier Relations: The Case of the U.S. Automobile Industry," *Business History Review*, (65), 781-824.

Hennart, J. (1988), "Upstream Vertical Integration in the Aluminum and Tin Industries," *Journal of Economic Behavior and Organization*, (9), 281-299.

Hennart, J. (1990), "Explaining the Swollen Middle: Why Most Transactions are a Mix of 'Market' and 'Hierarchy,' Working Paper.

Hill, C. (1990), "Cooperation, Opportunism, and the Invisible Hand: Implications for Transaction Cost Theory," *Academy of Management Review*, (15), 500-513.

Holmstrom, B. and O. Hart (1985). *The Theory of Contracts*. Photocopy, MIT Working Paper.

Jacobson, C. (1988). "Strategic Linkages Between Hospitals and Physicians: A Transaction Cost Analysis." *Ph.D. Dissertation*, University of Minnesota.

John, G. and B. Weitz (1988), "Forward Integration into Distribution: An Empirical Test of Transaction Cost Analysis," *Journal of Law, Economics and Organization*, (4), 337-355.

Johnston, T. (1993). "Governing Transactions in Business Markets: Implications for Prediction and Performance." *Ph.D. Dissertation*, University of California at Berkeley.

Jones, G. (1987), "Transaction Costs, Property Rights, and Organizational Culture: An Exchange Perspective," *Academy of Management Journal*, (28), 454-467.

Joskow, P. (1987), "Contract Duration and Relationship-Specific Investments: Empirical Evidence from Coal Markets," *The American Economic Review*, (77), 168-185.

Joskow, P. (1988), "Asset Specificity and the Structure of Vertical Relationships: Empirical Evidence," *Journal of Law, Economics and Organization*, (4), 95-117.

Kerlinger, F. (1986). *Foundations of Behavioral Research.* Orlando, Florida: Harcourt Brace Jovanovich College.

Klein, B. (1988), "Vertical Integration as Organizational Ownership: The Fisher-Body--General Motors Relationship Revisited," *Journal of Law, Economics and Organization*, (4), Spring.

Klein, B., A. Crawford and A. Alchian, (1978), "Vertical Integration, Appropriable Rents, and the Competitive Contracting Process," *Journal of Law and Economics,* 21, 297-326.

Levy, D (1985), "The Transaction Cost Approach to Vertical Integration: An Empirical Examination," *Review of Economics and Statistics*, (67), 438-445.

Lewis-Beck, M. (1980). *Applied Regression: An Introduction.* Series: Quantitative Applications in the Social Sciences No. 22, Thousand Oaks, California: Sage.

Light, R., J. Singer and J. Willet. (1990). *By Design.* Cambridge, Massachusetts: Harvard University Press.

Lincoln, J. (1990), "Japanese Organization and Organizational Theory," In *Research in Organizational Behavior*, (eds. B. Staw and L. Cummings), (12), 255-294.

Macauley, S. (1963), "Non-contractual Relations in Business," *American Sociological Review,* 28, 55-70.

MacNeil, I. (1978), "Contracts: Adjustments of Long-Term Economic Relations Under Classical, Neoclassical and Relational Contract Law," *Northwestern University Law Review,* 72, 854-906.

Masten, S. (1984), "The Organization of Production: Evidence from the Aerospace Industry," *Journal of Law and Economics,* 27, 403-418.

Masten, S. (1988), "Minimum Bill Contracts: Theory and Policy," *Journal of Industrial Economics*, (32), 85-97.

Masten, S. and K. Crocker (1985), "Efficient Adaptation in Long-Term Contracts: Take-or-Pay Provisions for Natural Gas," *The American Economic Review*, (75), 1083-1093.

Masten, S., J. Meehan and E. Snyder (1989), "Vertical Integration in the U.S. Auto Industry," *Journal of Economic Behavior and Organization*, (12), 265-273.

Monteverde, K. and D. Teece (1982), "Supplier Switching Costs and Vertical Integration in the Automobile Industry," *Bell Journal of Economics*, (13), 206-213.

Naik, G. (1995), "Top Labs Shift Research Goals to Fast Payoffs," *Wall Street Journal*, May 22, 1.

Neter, J., W. Wasserman and M. Kutner. *Applied Linear Regression Models*. Homewood, Illinois: Irwin.

Myerson, A. "In Deal with Swiss Bank, Perot Systems Plans Growth," *New York Times*, September, 7, 1995.

Office of the Competition General of the Air Force, (1986). *Report to the Congress on Air Force Competition.*

Osborn, R. and C. Baughn (1990), "Forms of Interorganizational Governance for Multinational Alliances," *Academy of Management Journal*, (33), 503-519.

Palay, T. (1984), "Comparative Institutional Economics: the Governance of Rail Freight Contracting," *Journal of Legal Studies*, 13 , 265-288.

Park, C. and A. Dudycha (1974), "A Cross Validation Approach to Sample Size Determination For Regression Models," *Journal of the American Statistical Association*, (69), 214-218.

Peck, M. and F. Scherer (1962). *The Weapons Acquisition Process: An Economic Analysis*. Boston, MA: Harvard University Press.

Perrow, C. (1986). *Complex Organizations: A Critical Essay*. New York: Random House.

Pisano, G. (1989), "Using Equity Participation to Support Exchange: Evidence from the Biotechnology Industry," *Journal of Law, Economics and Organization*, (5), 109-127.

Porter, M. (1980). *Competitive Strategy*. New York: The Free Press.

Posner, R. (1992). *Economic Analysis of Law*. Boston, MA: Little, Brown.

Robins, J. (1987), "Organizational Economics: Notes on the Use of Transaction Cost Theory in the Study of Organizations," *Administrative Science Quarterly*, (32), 68-86.

Scherer, F. (1964). *The Weapons Acquisition Process: Economic Incentives*. Boston: Division of Research, Graduate School of Business Administration, Harvard.

Schwab, D. (1980), "Construct validity in organizational behavior," In *Research in Organizational Behavior*, (eds. B. Staw and L. Cummings), (2), 3-43.

Shapiro, E. and A. Sharpe, "Time Warner is Closer to Agreement to Buy Turner Broadcasting System." *Wall Street Journal*, September 12,1995.

Simon, H. (1961). *Administrative Behavior*. New York: Macmillan.

Stevens, J. (1992). *Applied Multivariate Statistics For The Social Sciences*. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Stertz, B. and J. White (1992). "GM's Top Buyer Shakes Up Motor City," *Wall Street Journal*, June 17, B1.

Stinchcombe, A. (1985). "Contracts as Hierarchical Documents," In *Organizational Theory and Project Management*, (eds. A. Stinchcombe and C. Heimer), Oslo: Norwegian University Press.

Tabachnick, B. and L. Fidell (1989). *Using Multivariate Statistics*. New York: Harper Collins.

Templin, C. (1988). "The Effect of Defense Contracting Requirements on Just-In-Time Implementation." *Ph.D. Dissertation*, Arizona State University.

Thompson, J. (1967). *Organizations In Action*. New York: McGraw-Hill.

Walker, G. and L. Poppo (1991), "Profit Centers, Single-Source Suppliers and Transaction Costs," *Administrative Science Quarterly*, (36), 66-87.

Walker, G. and D. Weber (1984), "A Transaction Cost Approach to Make-or-Buy," *Administrative Science Quarterly*, (29), 373-391.

Walker, G. and D. Weber (1987), "Supplier Competition, Uncertainty, and Make-or-Buy Decisions," *Academy of Management Journal*, (30), 589-596.

Webster's New Twentieth Century Dictionary (1970). New York: The World Publishing Company, p. 888.

Williamson, O. (1975). *Markets and Hierarchies*. New York: Free Press.

Williamson, O. (1979), "Transaction Cost Economics: The Governance of Contractual Relations," *Journal of Law and Economics*, (22), 233-261.

Williamson, O. (1983), "Credible Commitments: Using Hostages to Support Exchange," *The American Economic Review*, (73), 519-535.

Williamson, O. (1985). *The Economic Institutions of Capitalism*. New York: The Free Press.

Williamson, O. (1991), "Strategizing, Economizing and Economic Organization," *Strategic Management Journal*, (12), 75-94.

COST CONTRACTS

PIIN_ORDER_ID	PROG_STAGE_CD	CURR_BUY_NM	CURR_BUY_OFC_ID	CURR_BUY_PH_NM	TYP_CONTRACT_CD	RETIRED_DT
F3361578C1489	R	SOUTHER SU	AAKR	55311	U	1995-01-04
F3361578C3601	R	FORTNEY KI	FIKF	54427	U	1995-01-04
F3361581C1465	R	ROSS,D	AAKR	55311	U	1995-01-04
F3361582C1863	R	SOUTHER SU	AAKR	55311	S	1995-01-04
F3361583C3031	R	COX KEVIN	FIKF	54427	U	1994-11-21
F3361584C1438	R	COLLINS,R	AAKR	55201	U	1994-09-30
F3361584C1462	R	COLLINS,R	AAKR	55201	R	1995-01-04
F3361584C1506	R	COLLINS,R	AAKR	55201	U	1994-09-30
F3361584C1538	R	LEIF JOHN	AAKR	55311	T	1995-01-04
F3361584C1582	R	COLLINS,R	AAKR	55201	U	1994-09-30
F3361584C3219	R	COX KEVIN	FIKF	54427	U	1995-01-04
F3361586C3212	R	HAYNESWORT	FIKF	54427	S	1995-06-28
F3361587C1478	R	SMITH, KEN	AAKR	55311	U	1995-01-04
F3361587C3230	R	COX KEVIN	FIKF	54427	T	1995-01-04
F3361587C3615	R	COX KEVIN	FIKF	54427	S	1995-01-04
F3361589C0576	R	CLOSEOUT	PKO	52243	S	1994-03-10
F3361589C1062	R	CLOSEOUT	PKO	52243	U	1992-05-15
F3361589C2924	R	COVEY,P	POKA	52730	U	1995-06-15
F3361589C2931	R	COCHRAN, T	NA	59637	U	1995-06-14
F3361589C2959	R	CLOSEOUT	PKO	52243	U	1994-02-08
F3361589C2964	R	MALONE,C	POKB	52730	S	1995-06-15
F3361589C3206	R	FORTNEY KI	FIKF	54427	T	1995-01-04
F3361589C3223	R	JONES, MAR	FIKF	54427	T	1995-06-28
F3361589C3407	R	CLOSEOUT	PKO	52243	U	1994-02-08
F3361589C5552	R	CLOSEOUT	PKO	52243	U	1995-01-04
F3361589C5624	R	CLOSEOUT	PKO	52243	U	1994-02-07
F3361589C5718	R	CLOSEOUT	PKO	52243	U	1995-01-04
F3361589C5730	R	CLOSEOUT	PKO	52243	U	1994-02-08
F3361590C1428	R	CLOSEOUT	PKO	52243	S	1992-03-25
F3361590C1508	R	CLOSEOUT	PKO	52243	U	1994-05-26
F3361590C1510	R	CLOSEOUT	PKO	52243	U	1994-02-07
F3361590C2001	R	MALONE,C	POKB	52730	T	1995-02-28
F3361590C2005	R	MALONE,C	POKB	52730	U	1995-01-04
F3361590C2012	R	MALONE,C	POKB	52730	U	1995-01-04
F3361590C2030	R	GREGORIUS	POKB	54818	U	1995-02-28
F3361590C2053	R	STROBEL,D	POKA	55971	S	1995-06-10
F3361590C3403	R	JONES, MAR	FIKF	54427	S	1995-01-04
F3361590C3604	R	CLOSEOUT	PKO	52243	U	1994-06-01
F3361591C0004	R	CLOSEOUT	PKO	52243	U	1994-06-01
F3361591C2111	R	COVEY,P	POKA	52730	U	1995-02-28
F3361591C5737	R	CLOSEOUT	PKO	52243	S	1995-01-04
F3361594C2406	R	RILEY KEVI	POKB	54421	U	1995-03-02
F3361594C2409	R	MALONE,C	POKB	52730	U	1995-02-28

n=43

BS. "one last piece"

* R - R&D
F - Full Scale Development

09/27 13:42 * PLATINUM REPORT FACILITY

FIXED PRICE CONTRACTS

PIIN_ORDER_ID	PROG_STAGE_CD	CURR_BUY_NM	CURR_BUY_OFC_ID	CURR_BUY_PH_NM	TYP_CONTRACT_CD	RETIRED_DT
F3361589C1006	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C1078	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C1079	R	CLOSEOUT	PKO	52243	J	1992-06-25
F3361589C1080	R	CLOSEOUT	PKO	52243	J	1992-01-02
F3361589C1083	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C1084	R	CLOSEOUT	PKO	52243	J	1990-11-30
F3361589C1085	R	CLOSEOUT	PKO	52243	J	1992-06-25
F3361589C1086	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C1089	R	CLOSEOUT	PKO	52243	J	1991-08-16
F3361589C1096	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C1097	R	CLOSEOUT	PKO	52243	J	1990-12-28
F3361589C1100	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C1101	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C1102	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C1104	R	CLOSEOUT	PKO	52243	J	1992-01-02
F3361589C1118	R	CLOSEOUT	PKO	52243	J	1990-11-30
F3361589C1121	R	CLOSEOUT	PKO	52243	J	1991-01-16
F3361589C1125	R	CLOSEOUT	PKO	52243	J	1991-11-22
F3361589C1128	R	CLOSEOUT	PKO	52243	J	1991-11-27
F3361589C1143	R	CLOSEOUT	PKO	52243	J	1992-01-23
F3361589C2920	R	RILEY KEVI	POKB	54421	J	1995-01-04
F3361589C2926	R	CLOSEOUT	PKO	52243	J	1990-12-28
F3361589C2927	R	CLOSEOUT	PKO	52243	J	1991-12-21
F3361589C2929	R	CLOSEOUT	PKO	52243	J	1990-12-28
F3361589C2932	R	CLOSEOUT	PKO	52243	J	1991-02-06
F3361589C2933	R	CLOSEOUT	PKO	52243	J	1991-11-27
F3361589C2934	R	CLOSEOUT	PKO	52243	J	1991-11-27
F3361589C2936	R	CLOSEOUT	PKO	52243	J	1992-01-02
F3361589C2937	R	CLOSEOUT	PKO	52243	J	1994-09-26
F3361589C2938	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2939	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2940	R	CLOSEOUT	PKO	52243	J	1994-09-26
F3361589C2941	R	CLOSEOUT	PKO	52243	J	1991-06-13
F3361589C2942	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2944	R	CLOSEOUT	PKO	52243	J	1991-01-02
F3361589C2945	R	CLOSEOUT	PKO	52243	J	1991-11-26
F3361589C2946	R	CLOSEOUT	PKO	52243	J	1991-11-27
F3361589C2947	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2955	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2956	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2960	R	CLOSEOUT	PKO	52243	J	1990-11-09
F3361589C2967	R	CLOSEOUT	PKO	52243	J	1992-10-21
F3361589C2970	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2972	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2975	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C2977	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361589C3003	R	CLOSEOUT	PKO	52243	J	1994-06-01
F3361589C3008	R	CLOSEOUT	PKO	52243	J	1991-12-18
F3361589C3010	R	CLOSEOUT	PKO	52243	J	1994-05-26

87

* R - R & D
F - Full Scale Development

F3361589C3204	R	CLOSEOUT	PKO	52243	J	1992-04-17
F3361589C3209	R	TURNER,F	FIKA	55901	J	1991-11-27
F3361589C3213	R	CLOSEOUT	PKO	52243	J	1994-03-10

PIIN_ORDER_ID	PROG_STAGE_CD	CURR_BUY_NM	CURR_BUY_OFC_ID	CURR_BUY_PH_NM	TYP_CONTRACT_CD	RETIRED_DT
F3361589C3214	R	CLOSEOUT	PKO	52243	J	1991-12-17
F3361589C3403	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C3409	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C3410	R	CLOSEOUT	PKO	52243	J	1990-11-09
F3361589C3606	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C3607	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C3609	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C3802	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C3804	R	CLOSEOUT	PKO	52243	J	1991-01-02
F3361589C3806	R	RHODEN J W	FIKF	54427	J	1994-11-21
F3361589C3807	R	CLOSEOUT	PKO	52243	J	1994-03-23
F3361589C3808	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C5551	R	CLOSEOUT	PKO	52243	J	1992-05-22
F3361589C5554	R	CLOSEOUT	PKO	52243	J	1991-11-27
F3361589C5555	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C5556	R	CLOSEOUT	PKO	52243	J	1991-12-17
F3361589C5559	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C5638	R	CLOSEOUT	PKO	52243	J	1991-11-23
F3361589C5640	R	CLOSEOUT	PKO	52243	J	1991-02-12
F3361589C5641	R	CLOSEOUT	PKO	52243	J	1991-11-27
F3361589C5650	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361589C5652	R	CLOSEOUT	PKO	52243	J	1993-10-03
F3361589C5723	R	CLOSEOUT	PKO	52243	J	1991-09-11
F3361589C5732	R	CLOSEOUT	PKO	52243	J	1991-03-05
F3361589C5733	R	CLOSEOUT	PKO	52243	J	1991-12-10
F3361589C5734	R	CLOSEOUT	PKO	52243	J	1992-06-25
F3361590C1459	R	CLOSEOUT	PKO	52243	J	1992-05-08
F3361590C1466	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C1471	R	CLOSEOUT	PKO	52243	J	1991-11-16
F3361590C1472	F	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C1476	R	CLOSEOUT	PKO	52243	J	1991-11-22
F3361590C1479	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C1481	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C1482	R	CLOSEOUT	PKO	52243	J	1994-05-26
F3361590C1483	R	CLOSEOUT	PKO	52243	J	1991-09-10
F3361590C1484	R	CLOSEOUT	PKO	52243	J	1994-05-26
F3361590C1486	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C1487	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C1488	R	CLOSEOUT	PKO	52243	J	1992-07-22
F3361590C1490	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C1491	R	CLOSEOUT	PKO	52243	J	1991-09-11
F3361590C1501	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C1509	R	CLOSEOUT	PKO	52243	J	1992-01-23
F3361590C1517	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C2023	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C2058	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C2060	R	CLOSEOUT	PKO	52243	J	1994-09-26
F3361590C2064	R	CLOSEOUT	PKO	52243	J	1991-10-01
F3361590C2065	R	CLOSEOUT	PKO	52243	J	1991-12-18

F3361590C2068	R	CLOSEOUT	PKO	52243	J	1991-11-27
F3361590C2069	R	CLOSEOUT	PKO	52243	J	1991-11-27
F3361590C2071	R	CLOSEOUT	PKO	52243	J	1994-03-10

PIIN_ORDER_ID	PROG_STAGE_CD	CURR_BUY_NM	CURR_BUY_OFC_ID	CURR_BUY_PH_NM	TYP_CONTRACT_CD	RETIRED_DT
F3361590C2072	R	STROBEL,D	POKA	55971	J	1995-01-04
F3361590C2073	R	COVEY,P	POKA	52730	J	1995-03-16
F3361590C2074	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C2075	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C2076	R	COVEY,P	POKA	52730	J	1995-06-15
F3361590C2077	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C3007	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C3210	R	CLOSEOUT	PKO	52243	J	1991-06-20
F3361590C3215	R	COX KEVIN	FIKF	54427	J	1995-01-04
F3361590C3408	R	CLOSEOUT	PKO	52243	J	1991-11-20
F3361590C3611	R	CLOSEOUT	PKO	52243	J	1991-12-17
F3361590C3614	R	CLOSEOUT	PKO	52243	J	1992-06-25
F3361590C3615	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361590C3805	R	CLOSEOUT	PKO	52243	J	1991-12-18
F3361590C3806	R	CLOSEOUT	PKO	52243	J	1992-01-02
F3361590C5000	R	CLOSEOUT	PKO	52243	J	1990-11-09
F3361590C5004	R	CLOSEOUT	PKO	52243	J	1991-03-28
F3361590C5005	R	CLOSEOUT	PKO	52243	J	1992-03-21
F3361590C5800	R	CLOSEOUT	PKO	52243	J	1991-06-26
F3361590C5802	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C5926	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C5931	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C5932	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C5933	R	CLOSEOUT	PKO	52243	J	1991-12-10
F3361590C5934	R	CLOSEOUT	PKO	52243	J	1991-09-20
F3361590C5935	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C5936	R	CLOSEOUT	PKO	52243	J	1992-06-25
F3361590C5937	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361590C5939	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C5940	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361590C5942	R	CLOSEOUT	PKO	52243	J	1991-09-16
F3361590C5943	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C1731	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C1732	R	CLOSEOUT	PKO	52243	J	1992-01-29
F3361591C1733	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361591C1737	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C1738	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C1739	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361591C1740	R	CLOSEOUT	PKO	52243	J	1992-07-22
F3361591C1753	R	CLOSEOUT	PKO	52243	J	1992-07-31
F3361591C1754	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C1755	R	CLOSEOUT	PKO	52243	J	1992-09-15
F3361591C1771	R	CLOSEOUT	PKO	52243	J	1992-05-08
F3361591C1774	R	CLOSEOUT	PKO	52243	J	1992-10-21
F3361591C2122	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C2123	R	CLOSEOUT	PKO	52243	J	1992-09-15
F3361591C2124	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C2125	R	CLOSEOUT	PKO	52243	J	1992-09-15
F3361591C2126	R	CLOSEOUT	PKO	52243	J	1994-03-10

F3361591C2127	R	GREGORIUS	POKB	54818	J	1995-02-28
F3361591C2128	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C2129	R	CLOSEOUT	PKO	52243	J	1994-02-08

PIIN_ORDER_ID	PROG_STAGE_CD	CURR_BUY_NM	CURR_BUY_OFC_ID	CURR_BUY_PH_NM	TYP_CONTRACT_CD	RETIRED_DT
F3361591C2130	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C2148	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C3001	R	CLOSEOUT	PKO	52243	J	1992-05-22
F3361591C3002	R	CLOSEOUT	PKO	52243	J	1992-07-31
F3361591C3003	R	CLOSEOUT	PKO	52243	J	1992-08-06
F3361591C3204	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C3602	R	CLOSEOUT	PKO	52243	J	1992-10-21
F3361591C3603	R	CLOSEOUT	PKO	52243	J	1992-07-31
F3361591C3802	R	CLOSEOUT	PKO	52243	J	1992-05-22
F3361591C3803	R	CLOSEOUT	PKO	52243	J	1992-09-17
F3361591C5624	R	CLOSEOUT	PKO	52243	J	1994-06-01
F3361591C5627	R	CLOSEOUT	PKO	52243	J	1994-05-26
F3361591C5629	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C5633	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361591C5723	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361591C5724	R	CLOSEOUT	PKO	52243	J	1992-03-21
F3361592C1057	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C1060	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C1061	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C1066	R	CLOSEOUT	PKO	52243	J	1995-01-04
F3361592C1068	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C1069	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C1070	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C1071	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C1072	R	CLOSEOUT	PKO	52243	J	1995-01-04
F3361592C1073	R	CLOSEOUT	PKO	52243	J	1995-01-04
F3361592C1074	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C2233	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C2238	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C2239	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2241	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2242	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2243	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2245	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C2247	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2248	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2249	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2251	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2252	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2253	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C2254	R	REED ROSE	POKA	55971	J	1995-01-04
F3361592C2255	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C2265	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C2271	R	REED ROSE	POKA	55971	J	1995-01-04
F3361592C2291	R	CLOSEOUT	PKO	52243	J	1994-05-26
F3361592C3004	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C3207	R	CLOSEOUT	PKO	52243	J	1994-05-26
F3361592C3209	R	CLOSEOUT	PKO	52243	J	1994-05-26
F3361592C3605	R	CLOSEOUT	PKO	52243	J	1994-03-10

F3361592C3609	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C3610	R	COX KEVIN	FIKF	54427	J	1995-01-04
F3361592C3808	R	CLOSEOUT	PKO	52243	J	1994-03-10

PIIN_ORDER_ID	PROG_STAGE_CD	CURR_BUY_NM	CURR_BUY_OFC_ID	CURR_BUY_PH_NM	TYP_CONTRACT_CD	RETIRED_DT
F3361592C5005	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C5937	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361592C5938	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C5939	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C5940	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361592C5941	R	CLOSEOUT	PKO	52243	J	1994-02-08
F3361593C1027	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361593C1242	R	CLOSEOUT	PKO	52243	J	1995-01-04
F3361593C1243	R	CLOSEOUT	PKO	52243	J	1995-01-04
F3361593C1246	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361593C1248	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361593C1274	R	CLOSEOUT	PKO	52243	J	1995-01-04
F3361593C1276	R	CLOSEOUT	PKO	52243	J	1994-05-26
F3361593C1298	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361593C1299	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361593C1300	R	CLOSEOUT	PKO	52243	J	1995-01-04
F3361593C2313	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361593C2318	R	STROBEL,D	POKA	55971	J	1995-01-04
F3361593C2322	R	EVERIDGE,T	POKB	54818	J	1995-01-04
F3361593C2324	R	REED ROSE	POKA	55971	J	1995-02-28
F3361593C2326	R	REED ROSE	POKA	55971	J	1995-02-28
F3361593C2327	R	REED ROSE	POKA	55971	J	1995-01-04
F3361593C2328	R	REED ROSE	POKA	55971	J	1995-01-04
F3361593C2329	R	REED ROSE	POKA	55971	J	1995-01-04
F3361593C2339	R	GREGORIUS	POKB	54818	J	1995-01-04
F3361593C2376	R	REED ROSE	POKA	55971	J	1995-02-28
F3361593C3002	R	JONES, MAR	FIKF	54427	J	1995-06-28
F3361593C3600	R	KOPA,L	FIKA	55901	J	1995-07-31
F3361593C3605	R	FORTNEY KI	FIKF	54427	J	1995-01-04
F3361593C3606	R	HANEY,R	FIKA	55901	J	1995-01-04
F3361593C3610	R	CLOSEOUT	PKO	52243	J	1994-05-26
F3361593C3801	R	STEWART,G	FIKA	54427	J	1995-01-04
F3361593C3802	R	RHODEN J W	FIKF	54427	J	1995-01-04
F3361593C5331	R	CLOSEOUT	PKO	52243	J	1994-03-10
F3361593C5343	R	SATTESON,J	MLKN	55051	J	1995-01-04
F3361593C5346	R	GREATHOUSE	MLKM	55936	J	1995-01-04
F3361593C5372	R	CLOSEOUT	PKO	52243	J	1995-01-04
F3361594C2446	R	RILEY BARB	POKA	55971	J	1995-06-15
F3361594C2449	R	REED ROSE	POKA	55971	J	1995-06-15
F3365789C2175	R	LOVEJOY, D	PKGA	56134	J	1995-07-03
F3365789C2208	R	VARGO, R	NA	59637	J	1995-04-03
F3365789C2210	R	RANDALL, G	NA	59637	J	1995-04-04
F3365789C2211	R	VARGO, R	NA	59637	J	1995-03-13
F3365789C2212	R	RANDALL, G	NA	59637	J	1995-04-03
F3365789C2213	R	VARGO, R	NA	59637	J	1995-03-21
F3365789C2214	R	VARGO, R	NA	59637	J	1993-02-12
F3365789C2216	R	VARGO, R	NA	59637	J	1993-07-28
F3365789C2217	R	WEBSTER, W	NA	50485	J	1994-08-02
F3365789C2218	R	RANDALL, G	NA	59637	J	1993-01-28

F3365789C2219	R	RANDALL, G	NA	59637	J	1993-03-01
F3365789C2222	R	RANDALL, G	NA	59637	J	1994-03-17
F3365789C2223	R	WEBSTER, W	NA	50485	J	1994-03-14

PIIN_ORDER_ID	PROG_STAGE_CD	CURR_BUY_NM	CURR_BUY_OFC_ID	CURR_BUY_PH_NM	TYP_CONTRACT_CD	RETIRED_DT
F3365789C2224	R	VARGO, R	NA	59637	J	1994-03-14
F3365789C2234	R	LONG,A	PKGA	56134	J	1995-07-03
F3365789C2248	R	FALENSKY,K	SMKA	55107	J	1990-10-31
F3365789C2252	R	BREED,M	RWKA	56257	J	1992-04-19
F3365789C2274	R	WYNNE, P.	PKGA	56134	J	1995-07-03
F3365790C2047	F	JONES, F.	YPKSA	56838	J	1995-04-13
F3365790C2105	R	SMITH, G.	PKGA	56134	J	1995-05-10
F3365791C2032	R	LONG,A	PKGA	56134	J	1995-08-04
F3365791C2046	R	ROSE, M.	PKGA	56134	J	1995-08-04
F3365791C2148	R	SMITH, G.	PKGA	56134	J	1995-09-06
F3365791C2173	R	LOVEJOY, D	PKGA	56134	J	1995-04-25
F3365791C2176	R	ROSE, M.	PKGA	56134	J	1995-04-25
F3365791C2188	R	RAASCH, D.	SMKAB	53358	J	1993-09-30
F3365791C2211	R	LOVEJOY, D	PKGA	56134	J	1993-01-28
F3365791C2289	R	WHITE, C.	PKGA	56134	J	1995-04-25
F3365792C3515	R	BEERS,R.	QLAX	57132	J	1995-05-24
F3365792C3520	R	BEERS,R.	QLAX	57132	J	1995-07-03
F3365792C3525	R	COFFIELD,	SDAK	57132	J	1995-05-19
F3365792C3530	R	BEERS,R.	QLAX	57132	J	1995-07-03
F3365792C3535	R	BEERS,R.	QLAX	57132	J	1995-05-24
F3365792C3540	R	BEERS,R.	QLAX	57132	J	1995-06-20
F3365792C3545	R	BEERS,R.	QLAX	57132	J	1995-06-30
F3365793C2228	R	VARGO, R	NA	59637	J	1995-03-13
F3365793C2229	R	RANDALL, G	NA	59637	J	1995-03-14
F3365793C2230	R	VARGO, R	NA	59637	J	1995-03-14
F3365793C2231	R	VARGO, R	NA	59637	J	1995-03-14
F3365793C2232	R	VARGO, R	NA	59637	J	1995-03-13
F3365793C2233	R	VARGO, R	NA	59637	J	1995-06-27
F3365793C2234	R	VARGO, R	NA	59637	J	1995-04-03
F3365793C2240	R	STELLINI,D	NA	59637	J	1995-03-13
F3365793C2241	R	VARGO, R	NA	59637	J	1995-03-13

University of Cincinnati

College of Business Administration

Department of Management
University of Cincinnati
PO Box 210165
Cincinnati OH 45221-0165

Carl H. Lindner Hall
Phone (513) 556-7120

FROM: Terry R. Adler 14 Sep 95

SUBJECT: Access to ASC Contracting Database for Research Purposes

TO: Brigadier General Richard H. Roellig
Headquarters Air Force Material Command/PK
Wright-Patterson AFB OH 45433

1. I am requesting access to Aeronautical Systems Center's (ASC's) contracting database for the purposes of conducting research on the efficiency of organizations. To do this, I need access to ASC's archival files regarding completed development and production contracts for Air Force weapon systems during the period of FY81 to FY95. Contracts completed during this period should provide adequate data from which to research necessary efficiency measures.

2. Per our previous discussion, I would like to examine contract information in ASC files to include pre- and post contract award information, contract performance and contract close-out information. This type of information is important for completing my dissertation titled "A Transaction Cost Analysis of Hybrid Forms of Contracting: Implications for Prediction and Performance." The information provided and my subsequent analysis and research should benefit the government, academia and commercial interests in contract formulation and execution.

3. I would also like to get a copy of any correspondence between Gen Roellig and ASC Contracting (ASC/PK) to include as attachments in my dissertation. If you need further information, please feel free to contact me at (513) 429-4564. Thank you for your timely cooperation.

Terry R. Adler
Ph.D. Candidate
Department of Management
University of Cincinnati
Cincinnati Ohio 45221

DEPARTMENT OF THE AIR FORCE
Headquarters Air Force Materiel Command
Wright-Patterson Air Force Base Ohio

15 September 1995

MEMORANDUM FOR ASC/PK (MR. GENE SMALLING)

FROM: HQ AFMC/PK

SUBJECT: Access to ASC Contracting Database

1. Please provide access to ASC's contracting database for Major Terry R. Adler. He will be conducting research in fulfillment of his Air Force sponsored Ph.D. requirement from the Air Force Institute of Technology, School of Systems and Logistics, Wright-Patterson AFB, Ohio.

2. Terry needs to be able to review all ASC development and production contracts that have been completed or terminated between fiscal years 1981 to 1995. The information he acquires will support his dissertation titled "A Transaction Cost Analysis of Defense Contracting: Implications for Prediction and Performance" and should be of great interest to the DOD contracting community. Consequently, he should be able to examine pre- and post-contract award, contract performance and contract close-out information for all types of contracts. He will need to access this information from mid-November 1995 to end-of-February 1996 to gather the appropriate data he needs to finish his dissertation. He also needs a place to review these documents as he goes through these contracts.

3. If further information is needed, please feel free to contact Maj Adler at his home number at 429-4564. Thank you for your timely cooperation.

Richard H. Roellig
RICHARD H. ROELLIG
Brigadier General, USAF
Director of Contracting